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KALA AZAR.

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1934. Aug. Vol. 26. No. 8. pp. 1369–1395.—La leishmaniose viscérale dans les pays méditerranéens [pp. 1369–1370]. Le kala-azar en Yougoslavie [TARTAGLIA (P.) pp. 1371–1381. With 2 maps.] Sur la répartition géographique des leishmanioses en Algérie d'après les documents de l'Institut Pasteur d'Alger [pp. 1382–1385. With 1 folding map.] Les leishmanioses en Égypte [KHALIL (M.) pp. 1386–1392. With 1 map. [22 refs.]]. La leishmaniose viscérale en U.R.S.S. [pp. 1393–1394]. Les leishmanioses en Perse [COULOGNER, p. 1395]. [**Leishmaniasis in Mediterranean Countries.**]

At the First International Congress of Hygiene for the Mediterranean (1932) it was decided that information should be sought regarding the distribution of kala azar in the Mediterranean basin. Accordingly the International Health Office in Paris and the Health Committee of the League of Nations joined forces and sent a questionary to the various countries concerned. Replies have been received from several countries but except for the information regarding kala azar in Yugoslavia and oriental sore in Egypt little that is new is forthcoming.

As regards Yugoslavia the author says that 89 cases of kala azar have been diagnosed, two-thirds by the discovery of parasites. The cases are limited to the southern half of the Adriatic coast but it is pointed out that this distribution is merely the result of the limitation of the inquiry to this part of the country. Undoubtedly with further experience and investigation the area will be extended. The disease has evidently existed for a long time, in spite of the fact that the first case was not diagnosed till 1930. In character it resembles that of other endemic centres in the Mediterranean and occurs chiefly in children, though adults are not exempt, as shown by seven cases, one of which was in a military surgeon 47 years of age. Canine kala azar has also been discovered, but no special association with the human disease has been noted. Sandflies are prevalent.

With reference to Algeria no new information is given and the same remark applies to Persia, the U.S.S.R. and Egypt as far as kala azar is concerned. Under Egypt, however, some recently acquired knowledge of oriental sore in this country is given. An endemic centre consisting of five heavily infected villages has been discovered to the north

of Zagazig. In the five villages 1,384 of the 1,408 inhabitants were examined, with the result that 232 showed active sores and 341 scars of healed sores. Investigations to the south and east indicate that the endemic area is about 30 kilometres in diameter, the number of cases diminishing as the distance from the village Kafr Ageeba increases. It is probable, however, that the endemic area will be found to extend to districts further north and west when these are examined. Cases of oriental sore in Egypt have occurred singly from time to time since its first detection by FERGUSON and RICHARDS in 1920, so that the discovery of this heavily infected centre is very striking.

C. M. Wenyon.

CAMINOPETROS (J.). Nouvelles données épidémiologiques et expérimentales sur les leishmanioses en Grèce. [**Leishmaniasis in Greece. Epidemiological and Experimental.**]—*Bull. Soc. Path. Exot.* 1934. May 9. Vol. 27. No. 5. pp. 443–450. With 3 figs.

The author discusses the distribution of human and canine kala azar in Greece and is able to point out that of 46 human cases seen during the course of 1933 and the beginning of 1934 in Athens 18 were from Athens itself, the others having come from various parts of the country, showing that the disease is widespread.

As regards the canine disease the author has seen 31 cases from Athens or the villages of Attica. Cases of the human and canine diseases have also been discovered in the Peloponesus, Kalamata and in the islands of Soetzia and Syra. At the end of the paper the author states that he has produced a generalized infection in a spermophile by the intrahepatic inoculation of leishmania obtained from a case of oriental sore originating in Athens and that this animal is susceptible to infection with the leucocytic haemogregarine (*Hepatozoon canis*) of the dog. He promises to give further details of these experiments in a future publication. *C. M. W.*

CAMINOPETROS (J.). Sur la faune des phlébotomes de la Grèce. Leur distribution dans les foyers de kala-azar. [**Phlebotomi of Greece in Relation to K.A. Foci.**]—*Bull. Soc. Path. Exot.* 1934. May 9. Vol. 27. No. 5. pp. 450–455.

From collections of sandflies made from various parts of Greece the following five species have been found :—*papatasi, major, tobbi, sergenti, parroti.* The three first named species have been found in different parts of Greece in the houses and kennels. It is noted that it is not exceptional to capture *major* and *tobbi* in houses in the morning or some time before sunset, contrary to the claim that these are exclusively nocturnal in habit. *C. M. W.*

MCCLURE (Robert B.). **Some Public Health Measures applied to Kala Azar.**—*Chinese Med. Jl.* 1934. July. Vol. 48. No. 7. pp. 659–662.

The author describes a system for the treatment of groups of kala azar cases in their own villages by technicians who are specially trained for this work. The treatment given is not free but on the basis of reduced fees for numbers treated at one time. It seems to the

author that this is a real public health measure, for the treatment of the small number of cases which come to hospital from a triangular area measuring 90 by 100 by 60 miles does little if anything to check the spread of the disease. For details of the method and its cost reference must be made to the paper itself. *C. M. W.*

RUIZ (Pedro Máximo). A proposito de tres casos de kala-azar infantil. [**Three Cases of Infantile K.A.**]—*Medicina Países Cálidos.* Madrid. 1934. Sept. Vol. 7. No. 9. pp. 429–432.

The three cases referred to are of interest in that the nature of the disease was not suspected till leishmania were discovered in the blood films. It is evident that when spleen puncture is not possible the examination of blood films, either thick or thin, may be carried out for diagnostic purposes. *C. M. W.*

GILKS (John L.). [**Discovery of a Case of Kala Azar from the Elgeyo Reserve.**] [Correspondence.]—*East African Med. Jl.* 1934. June. Vol. 11. No. 3. pp. 101–102.

A note on a case of kala azar in Kenya appeared in the *East African Journal* (see this *Bulletin*, Vol. 31, p. 660) where it was described as the first autochthonous case to be diagnosed in Kenya by discovery of leishmania by spleen puncture. The writer of the letter calls attention to the fact that two cases diagnosed by liver puncture had previously been reported.

Both were autochthonous cases, the one in a European administrative officer who had been stationed on the northern frontier of the colony and the other in a Somali woman from the same district. The European officer was on his first tour in Kenya and apart from service in France during the war had never been out of England till he left for service in Kenya. The two cases were noted on p. 86 of the Annual Medical Report for the year ending 31st December, 1921, Colony and Protectorate of Kenya. *C. M. W.*

SMITH (R. O. A.) & LAL (Chiranji). **Peri-Anal Ulceration complicating Kala-Azar.**—*Indian Med. Gaz.* 1934. Sept. Vol. 69. No. 9. p. 509.

The patient was a Hindu male aged 25 years with a history of kala azar of 5 months duration. Shortly after his admission to hospital an ulcer at the side of the anus developed. It extended fairly rapidly round the anus and involved the gluteal folds on each side, in spite of the fact that neostibosan treatment for the kala azar had been commenced. As no other cause for the ulceration than the leishmania infection could be found the neostibosan treatment was intensified, a full dose of 0·3 gm. being given every day. Within 48 hours there was improvement, pain being no longer complained of. By the time the temperature had become normal the ulcer was practically healed. Ten days later a bubo developed in the right groin. This was opened and discharged pus containing *Staphylococcus aureus*. The bubo healed rapidly. The only cause suggested for this unusual ulceration was debility due possibly to venereal disease.

A case of cancrum oris in a kala azar child had appeared to be due to scurvy for a combined treatment with krysolgan, a gold compound, and plenty of vitamin C led to healing of the ulceration, the child

making a complete recovery. In a footnote it is pointed out that the routine treatment adopted by Dr. NAPIER for cancrum oris is injections of krysolgan commencing with a dose of 0·0001 gm. together with some benign mouth wash. *C. M. W.*

GIRAUD (P.) & VIGNE (P.). Lésions cutanées chez un enfant atteint de kala-azar. [**Skin Lesions in a Child with K.A.**]—*Bull. Soc. Path. Exot.* 1934. July 11. Vol. 27. No. 7. pp. 655–656.

The case reported was that of a 2½ year old child in Marseilles which was suffering from kala azar and had numerous small indolent ulcers distributed about the limbs, body and head. Though leishmania were found by spleen puncture none could be detected in scrapings from the sores. That these were due to the leishmania infection appeared probable, since with successful treatment of the general condition they healed in fifteen days. *C. M. W.*

BRAHMACHARI (P. N.). **Annular Type of Dermal Leishmanoid.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Aug. 4. Vol. 28. No. 2. pp. 205–206. With 2 plates.

The case described is that of a patient who had kala azar in 1928, for which he was treated with urea stibamine and apparently cured. Six months later skin lesions began to appear. These extended till at the time of writing there were very extensive lesions on various parts of the body. The peculiar feature of the lesions was their annular character. Section of the edge of one of the lesions showed thinning of the epidermis, absence of the papillary layer and replacement of the fibrous tissue by granulation tissue in which leishmania-laden cells occur. Two photographs show the lesions on the front of the body, arms and foot.

C. M. W.

GIRAUD (Paul) & POURSINES (Y.). Les altérations histologiques de la rate et du foie dans le kala-azar autochtone. (Étude de 12 cas personnels.) [**Histological Changes in Spleen and Liver in K.A. Twelve Cases.**]—*Arch. Méd. Gén. et Colon.* 1934. Vol. 3. No. 1. pp. 21–40. With 5 figs.

The detailed study of the spleen and liver from 12 cases of infantile kala azar has shown that as regards the histopathology several types can be recognized but that these may be regarded as stages in one pathological process. Though one part of the spleen may be more affected than another there appears to be in any one case a close parallel between the changes which have occurred in this organ and those found in the liver, so much so that it is legitimate to speak of a hepatosplenitis of kala azar. Those interested in the subject of histopathology must consult the article in the original. *C. M. W.*

BOGLIOLO (Luigi). Studi sulle leishmaniosi. Sulla anatomia patologica della leishmaniosi viscerale nell' uomo. [**Histopathology of K.A.**]—*Arch. Ital. Sci. Med. Colon.* 1934. Aug. 1 & Sept. 1. Vol. 15. Nos. 8 & 9. pp. 588–636; 641–697. [5 pages of refs.] English summary (4 lines).

As a result of an autopsy on a case of infantile kala azar and the detailed study of the material obtained, together with the examination

of spleen smears obtained for diagnostic purposes from another case and bone marrow smears made for the same reason from six others, the author has described the histopathology of infantile kala azar, reviewed and tabulated the conclusions of previous workers on the subject, and generally discussed and compared his own with the findings of other investigators. *C. M. W.*

i. NATTAN-LARRIER (L.) & GRIMARD-RICHARD (L.). Diagnostic des infections leishmaniennes par la formol-stibosane réaction. [**Diagnosis of Leishmaniasis by the Formol-Stibosan Reaction.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 21. pp. 492–494.

ii. ——, NOUGUÈS (S.) & GRIMARD-RICHARD (L.). Action de l'ultrafiltration sur certaines réactions des sérums leishmaniens. [**Effect of Ultrafiltration on Reactions of Leishmanial Serums.**]—*Ibid.* No. 22. pp. 585–587.

iii. —— & GRIMARD-RICHARD (L.). Action de certains composés organiques d'antimoine sur les sérums leishmaniens. [**Action of Organic Compounds of Antimony on Leishmanial Serums.**]—*Ibid.* No. 23. pp. 716–718.

iv. ——, —— & NOUGUÈS (S.). Action de certains acides organiques sur les sérums leishmaniens. [**Action of Organic Acids on Leishmanial Serums.**]—*Ibid.* No. 24. pp. 802–805.

v. —— & ——. Diagnostic des infections leishmaniennes par l'acido-gélification du sérum. [**Diagnosis of Leishmaniasis by Acid-Gelification of Serum.**]—*Ibid.* No. 25. pp. 920–922.

i. In testing the formol-gel reaction and the antimony test in kala azar the authors have found that more reliable results are given if the two methods are combined in what they call the formol-antimony test.

To 0·5 cc. of suspected serum are added 4 drops of a 10 per cent. solution of neostibosan followed immediately by 0·5 cc. of commercial formol. In positive cases in place of the general opacity produced by formol alone there are formed large flocculi which collect into a heavy precipitate reaching nearly to the top of the liquid in the tube. It is claimed that the test will give a positive result in most cases, human and canine, of kala azar.

ii. In most cases the serum of subjects, human or animal, infected with *Leishmania donovani* is solidified and rendered opaque in a few minutes by the addition of formol at the rate of 0·5 cc. of formol to 1 cc. of serum (formol-gel reaction). It is known that in the case of syphilitic and some other sera the addition of formol produces a solidification or gelification without any loss of transparency or change in colour. It seemed possible that in the formol-gel test for kala azar two factors were involved, the one producing gelification and the other change in colour. The authors accordingly submitted sera of infected dogs to ultrafiltration. The result was that the filtered sera retained the property of becoming opaque on the addition of formol while the gelification did not occur at all or only after a period of 18 hours. These results seem to indicate that the collodion membranes used removed the gelification factor either completely or to a large extent. It was noted that the property of kala azar serum of forming a heavy flocculation on the addition of formol and neostibosan together was affected by filtration only in that the flocculate appeared finer, a result which suggests that the formol antimony reaction does not depend on the presence of two factors, as does the formol reaction alone.

iii. The authors have tested three organic antimony compounds of equal antimony content from the point of view of their capacity to replace urea stibamine or neostibosan in the antimony or formol-antimony reactions. It was found that one of these was partly satisfactory but none gave such clear results as the pentavalent compounds more usually employed. The one which gave a partial result was antimony-thiosalicylate of sodium, a trivalent compound.

iv. The addition to the serum of a normal dog of formic, lactic or acetic acid leads in 24 hours to more or less complete gelification associated with opalescence. In the case of the sera of dogs with kala azar the gelification commences directly the reagent is added or after a delay of not more than 10 minutes, and is associated with opalescence which is more marked than that occurring in normal sera after 24 hours. It would seem that the action of formol in the formol-gel test is comparable with that of the acids mentioned.

v. It seemed possible that lactic, formic or acetic acid might replace formol in the formol-gel test for kala azar. As regards canine kala azar it was found that with lactic acid or formic acid the condition of the different sera was fairly uniform after the expiry of equal intervals of time and in this respect the results appeared more uniform than those given in the formol-gel test. It did not seem likely that the lactic acid test would be of value in the diagnosis of human kala azar as normal serum was too rapidly gelified. On the other hand the reaction with normal guineapig serum was less rapid than with that of the dog.

C. M. W.

D'Oelsnitz (M.) & Ronchèse (A. D.). Nécessité d'une technique et d'une interprétation précises de la réaction de Chopra pour le diagnostic du kala-azar. [**Technique and Interpretation of Chopra's K.A. Reaction.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1934. Oct. 29. 50th Year. 3rd Ser. No. 26. pp. 1320–1321.

In the antimony test for kala azar the authors find that if on to the surface of the serum to be tested in a narrow tube is gently poured the solution of urea stibamine there forms at the surface of contact of the two liquids in the case of kala azar sera a disc of a firm consistency which retains its place in the narrow tube but in a wider one sinks to the bottom without disintegrating. A false reaction may also show a disc which, however, forms more slowly and is less dense in that it breaks up spontaneously into flocculi which sink through the liquid. In other false reactions there is formed a mere trace of precipitate which is quickly dispersed through the serum. In the authors' experience the true reaction is given only by sera of kala azar cases.

C. M. W.

Auricchio (L.) & Chieffi (A.). Una nuova sensibile e rapida siero-reazione per la diagnosi di leishmaniosi infantile. (Nota preventiva.) [**A New Sero-Reaction for the Diagnosis of K.A.**]—*Pediatria.* 1934. Aug. 1. Vol. 42. No. 8. pp. 915–920. With 3 figs. English summary (4 lines).

The authors have found that the addition of 1 cc. of a 1 in 600 solution of peptonate of iron (that employed by them was Merck's, containing 5 per cent. Fe_2O_3) to 0·2 cc. of kala azar serum gives after

10 to 40 minutes incubation at 37°C. an opalescence which increases in intensity. It is stated that this reaction is specific and may be used as a diagnostic procedure. *C. M. W.*

CHUNG (Huei-Lan). **Flagellation of *Leishmania donovani* in Blood from Normal and Infected Hamsters.**—*Proc. Soc. Experim. Biol. & Med.* 1934. June. Vol. 31. No. 9. pp. 1259–1260.

If a small portion of infected spleen from a kala azar hamster is ground up with heart blood from the same or a healthy animal, and hanging drop preparations are made from the material, it will be found that at a temperature of 20°C. or 22°C. flagellates will develop from the leishmania. In spite of the fact that no growth occurred at 37°C. the author suggests that the result indicates the possibility of leishmania flagellating in the mammalian host. *C. M. W.*

NATTAN-LARRIER (L.) & GRIMARD-RICHARD (L.). Culture des leishmania sur le milieu N.N.N. "mouillé." [**Culture of Leishmania on Wetted N.N.N. Medium.**]—*Bull. Soc. Path. Exot.* 1934. July 11. Vol. 27. No. 7. pp. 656–658.

In order to increase the water of condensation in N.N.N. medium for the culture of leishmania the authors have found that after the first incubation of the freshly prepared medium at 38°C. for 24 hours 2 cc. of 0·9 per cent. sodium chloride solution can be added to each tube. The tubes are allowed to remain at 38°C. in the sloped position for a further 24 hours. This medium has given a good growth of leishmania. Furthermore it has been found that after growth has proceeded for some time in one of these tubes it is possible to remove the liquid and replace it by fresh saline solution. The tube is incubated at 38°C. for 8 to 24 hours in the sloped position, after which growth of the leishmania will recommence in the saline which has taken up sufficient haemoglobin from the solid part of the medium. The short exposure to 38°C. has not destroyed all the flagellates left in the tube. It is possible that the process might be repeated a number of times.

C. M. W.

ADLER (S.). **Culture of Leishmanias and Other Trypanosomidae in Haemoglobin-free Media.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Aug. 4. Vol. 28. No. 2. pp. 201–204.

In view of the statements which have been made by LWOFF, M. & A. (1933, 1934) and others that *Leptomonas ctenocephali* and *Strigomonas fasciculata* will not grow in haemoglobin-free media and that a concentration of 1 : 500 defibrinated rabbit blood is essential for continued culture of the former, the author points out that he has for many years cultivated various leishmania and trypanosomes in media in which the blood is replaced by rabbit serum (Locke-serum agar) where only unavoidable traces of blood (often less than 1 : 5000) are present.

C.M.W.

IGLESIAS (Democrates). Leishmaniosis canina natural en Fregeneda (Salamanca). [**Canine K.A. in Salamanca.**]—*Medicina Países Cálidos.* Madrid. 1934. Aug. Vol. 7. No. 8. pp. 370–374. [22 refs.]

The author discusses the formol-gel test for the diagnosis of canine kala azar. The application of the test to 10 dogs in Salamanca showed that these had a positive reaction. The dog giving the most marked reaction was destroyed and found to have a heavy leishmania infection.

C. M. W.

GIRAUD (Paul) & CIAUDO (P.). Absence de transmission héréditaire des caractères sérologiques de la leishmaniose interne chez le chien. [**Serological Characters of Canine K.A. not transmitted Hereditarily.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 20. pp. 433–435.

A female dog was infected with kala azar by intraperitoneal injection of spleen material from another dog. Six months later, after infection had been proved to have occurred, a litter of 10 young ones was born. The formol-gel and antimony reactions, which had been negative before the inoculation, became positive, while the albumin globulin ratio which had been 2·25 before inoculation became 0·63 a few days before the birth of the six young ones. The serum of six of these was pooled and it was found that the formol-gel and antimony reactions were negative. On the other hand the albumin-globulin ratio was 0·71. Careful examination of the organs of the six young dogs failed to reveal any leishmania infection. The authors do not regard the inversion of the albumin-globulin ratio as in any way specific for kala azar as are the other two reactions. *C. M. W.*

CAMINOPETROS (J.). Lésions cutanées du chien, revêtant les caractères du bouton d'Orient. [**Oriental Sore-like Lesions in K.A. Dogs.**]—*Bull. Soc. Path. Exot.* 1934. June 13. Vol. 27. No. 6. pp. 527–534. With 5 figs.

Attention is called to the existence in Greece of cutaneous lesions in dogs resembling oriental sore. From these leishmania can be obtained but, as has previously been noted by other observers, these lesions are merely manifestations of a generalized kala azar and are not oriental sores. The paper gives photographs of the skin lesions on three kala azar dogs. *C. M. W.*

SMITH (R. O. A.), KRISHNAN (K. V.) & MUKERJI (S.). **Identification of Larvae of the Genus** *Phlebotomus.*—*Indian Jl. Med. Res.* 1934. Apr. Vol. 21. No. 4. pp. 661–667. With 2 plates.

The authors have compared the external anatomy of the larvae of *Phlebotomus argentipes, papatasi* and "*minutus*" (in the broad sense of the word). They find differential characters in all parts of the larva's body; the characters are in the chaetotaxy and are fully illustrated.

Larvae of Phlebotomus can now be found in nature by washing soil and débris through a series of graded sieves. The authors are able to identify those of *P. argentipes* and in this way define its natural breeding places. *P. A. Buxton.*

KHALIL (M.). **Dermal Leishmaniasis. A Study of an Endemic Focus in Egypt.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Oct. Vol. 38. No. 10. pp. 417–433. With 11 text figs. [43 refs.]

This paper describes the endemic centre of oriental sore which was discovered in the Zagazig area about 30 to 40 miles north-east of Cairo. It has been referred to more briefly in another paper.

The subject is discussed from the epidemiological and endemiological aspects and it is concluded that, as no particular age group is more susceptible than another, the disease is of recent introduction. From the point of view of immunity it does not appear that this is absolute after one attack, for a number of people showing scars of old sores had become reinfected. It was also apparent that individuals with active sores were less liable to show malarial parasites in the blood than those without them. With reference to treatment many forms have been tried with unsatisfactory results. Surgical methods, such as thermo-cauterization, diathermy, and excision, were more reliable when they were applicable. Sandflies, chiefly *Phlebotomus papatasi*, were plentiful in the area. The endemic area lies on the camel route from Palestine and the disease has been traced all along this route from Salhia to Zagazig. Kantara, also on the route, was found by KLIGLER to be infected in 1923. *C. M. W.*

ROBERTS (F. W.). **Cutaneous Leishmaniasis. Report of Two Cases.**—*Arch. Dermat. & Syph.* 1934. Sept. Vol. 30. No. 3. pp. 401–408. With 4 figs. [20 refs.]

In both the cases reported the disease, diagnosed by discovery of *Leishmania tropica*, was contracted in the Eastern Mediterranean, though in the first case, in an Armenian youth aged 16, the first sign of the lesion was noticed on the front of the leg three months after arrival in the U.S.A. In the second case, in a girl, the disease had commenced in Palestine and was peculiar in that it finally took the form of a granulating area as large as the hand and situated behind the left shoulder. On one edge of this area was a long curved extending ulcer. A cure was effected by excision of the whole area by electrocautery, followed by skin grafting. *C. M. W.*

DOSTROVSKY (A.). **Leishmania Recidiva of the Skin.**—*Harefuah.* 1934. May–June. Vol. 8. No. 3. [In Hebrew pp. 118–124. With 1 text fig. & 4 figs. on 1 plate. English summary pp. 1–2.]

In reporting on cases of oriental sore in Palestine the author calls attention to the chronicity of the disease which is marked in some cases, one having been under observation for 6 years. The chronic lesions tend to heal at the centre and to extend slowly at the periphery where small nodules are formed on the skin surrounding the sore. These nodules in some cases form complete circles round the sore. Gradually the margin of the sore extends to absorb the nodules which generally occur in asthenic and poorly nourished subjects and in those who have received inadequate treatment. The possibility of tuberculosis of the skin or tertiary lues was considered but there was no evidence of this. The author says that the vaccine reaction and positive leishmania culture carried out by ADLER suggest a special type of leishmania which may be called "Leishmania recidiva." [The suggestion of a new

name for the parasite is perhaps unfortunate, as there is no evidence that the parasite is not *L. tropica.* Perhaps the author was naming the skin condition and had intended writing Leishmaniasis recidiva.]

C. M. W.

RABELLO, Jr. Structure histologique et allergie dans la leishmaniose américaine. [**Histology and Allergy in American Leishmaniasis.**] —*C. R. Soc. Biol.* 1934. Vol. 117. No. 29. pp. 210–212.

The characteristic structure of the skin lesion of S. American leishmaniasis is that of an inflammatory granuloma infiltrated with epithelioid cells and a certain number of giant cells. The examination of 62 of these cases at Rio de Janeiro between 1926 and 1934 has shown that it is only in the early months of an infection that the characteristic structure is seen.

In cases of about 6 months duration about half show the specific structure and the other half that of a simple granuloma. The longer the duration of the disease the fewer are the cases with the characteristic histological structure. In this connexion it is recalled that BUSS pointed out that leishmania could only be found in about half the cases. The specific lesion is not clearly defined in infections of the mucous membranes. The author considers the change in character of the lesions a protective reaction which occurs to a higher degree in the mucous membranes than in the skin ; hence the fact that the skin lesions are much more common than those of the mucosae.

C. M. W.

FOX (Howard). **American Leishmaniasis. Further Observations.**—*Arch. Dermat. & Syph.* 1934. Aug. Vol. 30. No. 2. pp. 241–242.

The article is mainly written as a protest against the use of the word " espundia " in American text books instead of the more general term " muco-cutaneous leishmaniasis " of which " espundia " is merely the local Peruvian and Bolivian name. The author says it would be just as inconsistent to speak of scabies as Hongkong itch. *C. M. W.*

PARROT (L.). **The Natural Transmission of Mediterranean Leishmaniasis.** —*Quart. Bull. Health Organisation, League of Nations.* Geneva. 1934. June. Vol. 3. No. 2. pp. 202–219. [89 refs.]

This is a general discussion of the possible methods of transmission of oriental sore and kala azar in the Mediterranean area. The author summarizes the available data and concludes that sandfly transmission is the most reasonable explanation of the distribution of these diseases.

C. M. W.

BOGLIOLO (Luigi). Studi sulle leishmaniosi. II. Le cosi dette " riserve del virus " leishmaniosico. [**The So-called Reservoirs of Leishmanial Virus.**]—*Ann. di Med. Nav. e Colon.* 1934. Sept.–Oct. 40th Year. Vol. 2. No. 3–4. pp. 534–548. [42 refs.] English summary.

After a lengthy discussion of the possible relationship of leptomonads of lizards, insects and euphorbias to kala azar and oriental sore, which are endemic in Apulia where the author works, he informs his readers that an examination of the local plants of the group referred to has given only negative results as regards the presence of flagellates. *C. M. W.*

BROQUET (C.). Questions concernant la leishmaniose viscérale dans le bassin méditerranéen. [**Mediterranean K.A.**]—*Bull. Office Internat. d'Hyg. Publique.* 1934. May. Vol. 26. No. 5. pp. 893–903.

This article concerns chiefly discussions on Mediterranean kala azar which took place at the International Congress of Mediterranean Hygiene at Marseilles in 1932, and gives no new information. *C. M. W.*

GRECO (Zaira). Prime osservazioni statistiche e considerazioni generali sulla leishmaniosi viscerale studiata in Puglia. [**K.A. in Apulia.**]—*Ann. di Med. Nav. e Colon.* 1934. July–Aug. 40th Year. Vol. 2. No. 1–2. pp. 406–430. [47 refs.]

The paper is a detailed analysis of the data relating to 49 cases of infantile kala azar observed between 1920 and 1933 in the district of Apulia in Southern Italy. *C. M. W.*

GRECO (Zaira). Il primo caso di leishmaniosi viscerale infantile con pigmentazione cutanea nel bacino del Mediterraneo (vero Kala-Azar). [**Case of Infantile K.A. with Skin Pigmentation in the Mediterranean Basin.**]—*Arch. Ital. Sci. Med. Colon.* 1934. July 1. Vol. 15. No. 7. pp. 518–526. [12 refs.] English summary (4 lines).

The case of infantile kala azar discussed in the paper was in a child aged 25 months, of Southern Italy. In the author's opinion the definite pigmentation of the skin which was such a marked feature of the case serves to link the Indian and Mediterranean diseases. *C. M. W.*

KOSTAREVA (E.). **Kala-Azar at Agdashski District of Armenia.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1933. Vol. 12. No. 4. [In Russian. pp. 299–300. English summary p. 301.]

It is recorded that at Agdash in Armenia during 1929–1931 the author diagnosed by spleen puncture 30 cases of kala azar chiefly, but not exclusively, in children. Instances of dermal leishmaniasis were also observed. *C. M. W.*

YEN (Albert C. H.) & CHUNG (Huei-Lan). **Cultivation of** *Leishmania donovani* **in Media of Embryonic Chick Tissues.**—*Proc. Soc. Experim. Biol. & Med.* 1934. June. Vol. 31. No. 9. pp. 1258–1259.

It has been found that in sterile chick tissues in Tyrode's solution leishmania will multiply as the flagellate form at 20°C. No growth occurred at 37°C. *C. M. W.*

SARNELLI (Tommaso). Sul primo caso di leishmaniosi cutanea (bottone d'Oriente) autoctono dell' Italia centrale. (Seconda memoria.) [**First Case of Oriental Sore from Central Italy.**]—*Arch. Ital. Sci. Med. Colon.* 1934. Sept. 1. Vol. 15. No. 9. pp. 698–705. With 4 figs. English summary (6 lines).

The case reported in this paper had been previously described by the author as probably the first case from Central Italy, Abruzzo. The lesion on the right eyelid cleared up under treatment with neostibosan.

C. M. W.

PELI (Gino) & BENIGNETTI (Diego). Leishmaniosi cutanea autoctona nella provincia di Pesaro-Urbino. [**Oriental Sore in the Province of Pesaro-Urbino.**]—*Giorn. Ital. di Malat. Esot. e Trop.* 1934. May 31. Vol. 7. No. 5. pp. 116, 119–122, 125–128. With 12 figs. [14 refs.]

A description of 5 cases of oriental sore from the Province of Pesaro on the Adriatic coast of Italy. The disease appears to be endemic in this area.

C. M. W.

RONCONI (Luigi). La röntgenterapia nella leishmaniosi cutanea. [**X-Ray Treatment of Oriental Sore.**]—*Policlinico.* Sez. Prat. 1934. Sept. 24. Vol. 41. No. 38. pp. 1480–1482.

The author describes the treatment of 2 cases of oriental sore by exposure to X-rays with very satisfactory result. *C. M. W.*

DE ALDA CALLEJA (Martin). Dos historias clinicas. "Kala-azar y fiebre recurrente."—*Medicina Paises Cálidos.* Madrid. 1934. Aug. Vol. 7. No. 8. pp. 375–379. With 1 chart.

DE BONA (Giuseppe). Contributo allo studio dell'antimonio e dei suoi composti in alcune affezioni tropicali. (Kala-azar—Granuloma ulcerativo venereo—Bilharziosi.)—*Arch. Ital. Sci. Med. Colon.* 1934. Aug. 1. Vol. 15. No. 8. pp. 571–576. English summary (4 lines).

BUTO (T.) & YAMAMOTO (Y.). Case of Kala-Azar found in a Native Child born in Niu-Chuang, Manchoukuo.—*Jl. Oriental Med.* 1934. July. Vol. 21. No. 1. [In Japanese pp. 151–156. With 1 text fig. & 3 figs. on 1 plate. [14 refs.] English summary p. 12.]

MONTAÑÉS (P.) & NEGRO (E.). Dos casos de botón de Oriente en la Región Valenciana.—*Trabajos del Sanatorio Nacional de Fontilles.* 1932–1933 Vol. 1. pp. 47–51.

MALARIA.

COVELL (G.) & BAILY (J. D.). **Malaria in Sind. Part IX. Malaria in Sukkur District. Part X. Malaria in Dadu District. Part XI. Malaria in Larkana District.**—*Records of the Malaria Survey of India.* 1934. June. Vol. 4. No. 2. pp. 119–143; 145–164; 165–191. [20 refs.]

Part IX. The subsoil water has been rising for some years and will cause an increase of malaria.

The Sukkur District is traversed by the Indus which passes through a gorge at Sukkur city. The Lloyd Barrage has been constructed at a point 3 miles below the gorge. A large part of the district consists of sandy desert, the rest is fertile alluvial plain. The average rainfall is 2 to 3 inches a year. A considerable part of the district is irrigated by canals coming from the Indus above the Lloyd Barrage. Epidemics of malaria occur about every 10 years, the last in 1929. These epidemic years are characterized by excessive monsoon rainfall. The spleen rates prior to the 1929 epidemic were 5 to 10 per cent. in areas under dry crop cultivation, 28 to 30 per cent. in areas under date palm cultivation, (where anopheles breed in the pits full of water which are dug round the bases of the trees), 25 to 30 per cent. in the area between the Indus and the flood-restriction embankments which is subject to annual flooding. Surveys made 8 to 10 months after the epidemic showed that the spleen rate was raised everywhere to 80 or 90 per cent. In one sub-district there has been a considerable rise in the subsoil water since 1924; this is attributed to increased rice cultivation. "A continuance of the present conditions will certainly lead to an increase of malaria in this area."

Part X.—The new Lloyd Barrage scheme may cause an increase of malaria.

Part of Dadu consists of hilly country, and part consists of a rich alluvial plain which lies between the hills and the Indus. The Manchar Lake lies in this plain. The whole of the drainage of the Lloyd Barrage scheme on the right bank of the Indus will be directed into this lake, which is connected with the Indus by the Aral river. The population is about 337,000. The incidence of malaria in the foothills is very slight, in striking contrast to conditions in other foothill regions and is attributed to the absence of such mosquitoes as *A. fluviatilis* (*listonii*), *A. maculatus*, and *A. minimus*. The Lloyd Barrage scheme will increase the rice-growing area by 200,000 acres; this may cause a rise in the subsoil water, followed by water-logging and an increase in malaria.

Part XI.—The Lloyd Barrage Scheme apparently caused an increase of malaria in Larkana.

The climate is very severe. The maximum temperature in July is generally above 110°F. and the minimum not below 80°. The ubiquitous canals and general submergence add moisture to the heat. The mean rainfall is only about 3 inches. The major part of the great rice tract of Sind lies in this district and it is irrigated, under the Lloyd barrage scheme, by the Central Rice Canal and its branches. The rice tract of Sind is a hyperendemic area with spleen rates ranging from 40 to 70 per cent. These figures were raised about 20 per cent. by the

1929 epidemic and, in some villages, they have not returned to the pre-endemic level. The barrage scheme came into operation in 1932, and it was followed by an increase of malaria which was probably caused by it. Whether this increase is permanent or not will depend upon the provision of efficient drainage. *W. Fletcher.*

SWEET (W. C.) & RAO (B. A.). **Notes on Malaria in Mysore State. Part V. The Control of Anopheline Breeding in Bangalore City and its Cost in Mysore State.**—*Records of the Malaria Survey of India.* 1934. June. Vol. 4. No. 2. pp. 95–110. With 5 graphs.

There is not very much malaria in Bangalore; it has been dealt with by Paris green and Gambusia.

Bangalore is about 3,000 feet above sea level; it has a population of 172,000; the average maximum temperature is 85°F. and the average minimum 65°F. It is divided into two separate municipalities, the Civil and Military Station and the City. The spleen rate for the entire city was 23·2 in 1927, since when there has been a continuous decline, with a sharp drop between 1930 and 1931; in 1933, it was only 1·3. The parasite rate for the entire city, for the years 1931, '32, '33 was 3·8, and nearly all the infections were benign tertian. *A. culicifacies* breeds in the city tanks, and *A. stephensi* breeds in the wells; the latter mosquito was found in 80 per cent. of the house wells. The condition of the city's water supply precluded the closing of the wells. One of the authors brought a few *Gambusia affinis* from Italy in 1928. Nearly all of them died, but after they had been taken from the fountain in which they were originally placed and distributed in ponds and wells, they became acclimatized and increased to such an extent that millions are available and consignments have been shipped to various parts of India. Some of the wells have been dealt with by introducing Gambusia, and others by applying 2 per cent. Paris green. Tests for arsenic were positive only immediately after the application of Paris green; none was found in the water or in the deposits from wells which had been treated weekly for over a year. The Paris green treatment was the more successful, but the Gambusia method was cheaper and it has been adopted. The wells are restocked every 3 or 4 months. Malaria control was begun in January 1930 and was followed by a sharp drop in the spleen rate which has been maintained since. There was also a great reduction in the numbers of anopheles caught at the catching stations. *W. F.*

SWEET (W. C.). **Notes on Malaria in Mysore State. Part VI. Haemoglobin and Malaria.**—*Records of the Malaria Survey of India.* 1934. June. Vol. 4. No. 2. pp. 111–117. With 1 graph.

The average haemoglobin for males was 72·2 and for females 70·9 per cent. People with malaria parasites in the blood had an average haemoglobin of 69·2; those without parasites averaged 71·8. In one village, the average haemoglobin was 67·7 before control was begun, and 77·7 three years after. "The increases and decreases in average haemoglobins were statistically significant, but there was no way of judging what this might mean for the general health of the people concerned." Tallquist's method was used. *W. F.*

WINTER (H. G.). **Malaria Control in Bengal.**—*Jl. Roy. Army Med. Corps.* 1934. Oct. Vol. 63. No. 4. pp. 238–246.

The author shows how the development of the Ganges Delta has increased malaria.

Antimalaria work, in the past, was largely left to local authorities but, at the end of 1930, the Army Department of the Government of India recommended the formation of Anti-Malaria Co-operative Committees to co-ordinate the numerous schemes, and the Government of Bengal is now instituting these co-operative committees throughout the Province. In addition to the official organization, there are voluntary societies such as the Central Co-operative Anti-Malaria Society Ltd. There are over 2,000 of these voluntary societies in Bengal and the number is growing. Funds are obtained by donations and by loans from the Government. They are administered by the villagers, and most of the labour is voluntary.

The malaria of the Delta of the Ganges is largely man made. Nature's method of land-reclamation is for the rivers in the flood season, bringing up large quantities of silt, to overflow into low-lying marsh-areas where the silt is deposited, thus raising the land level. Later, this flood water re-enters the rivers, and the greater volume, increasing the velocity of flow, scours out and deepens the river bed. Population has concentrated along the rivers which are the natural traffic arteries, and as the land is low-lying, the roads and railways have been built on embankments. This has interfered with natural drainage. Man's attempts at land reclamation have been by the embankment system, which consists of raising the banks of the rivers to prevent them overflowing into the marsh-areas, and providing sluice-gates in these embankments to drain the water off such land when the rivers are at their lowest. The evil effects of this method of reclamation have been : (*a*) decrease in the volume of water in the rivers and consequent lessened velocity, thus causing silting up and obstruction to navigation, and eventually complete stoppage of flow ; (*b*) the stoppage of the natural land raising process by silt ; (*c*) the loss of fertility of the ground owing to absence of the manurial value of natural river silt ; (*d*) obstruction to natural drainage ; (*e*) the causation of malaria by the formation of pools in the low-lying reclaimed areas. Wherever villages have sprung up, earth has been needed for raising the land round the huts and clay has been required for making bricks. Bricks are used not only for houses, but also for building roads. To obtain earth and clay, holes have been dug, and consequently the whole country is dotted with the lakes known as tanks. These tanks are usually the only water supply for washing, bathing and drinking ; in many cases they are choked with weeds and form ideal mosquito breeding grounds.

The main sewage and storm water outlet for the city of Calcutta is the Bidyadhari River. Owing to the expansion of the city and the effect of previous land reclamation schemes this river has rapidly silted up and consequently Calcutta is constantly being flooded during the monsoon. The salt lakes to the east of the city are the result of the silting of the rivers, and in this brackish water *A. ludlowi* breeds and is constantly spreading nearer and nearer to Calcutta.

The Chief Engineer to the Department of Public Health, Mr. F. C. GRIFFIN, has evolved a plan for dealing with the problem by restoring the natural drainage of the land and improving the rivers. Dr. S. N.

SUR, Malariologist to the Government of Bengal, has made an attempt to sterilize the population by mass treatment with quinine and plasmoquine; "up to date the results have been encouraging." *W. F.*

MILNE (J. Coutts). **Observations on Malaria in Taiping.**—*Malayan Med. Jl.* 1934. June. Vol. 9. No. 2. pp. 31–39. With 3 charts. [11 refs.]

There appears to be no correlation between meteorological conditions and the malaria curve in Taiping.

The average annual rainfall in Taiping is 166 inches. The incidence of malaria and rainfall is not correlated. There is little variation in relative humidity or temperature throughout the year. The monthly incidence of malaria, over a period of 6 years, shows an increase in May and June which is associated with an increase in *A. maculatus*—the "maculatus wave" of WATSON. There is a second small increase of malaria in October, possibly due to protracted incubation of infections acquired during the first period. Subtertian malaria causes more severe symptoms than benign tertian and consequently subtertian malaria is commoner in the hospitals of the Malay States. In 1932 out of 11,787 patients, 65·5 per cent. were subtertian and 27·08 per cent. benign tertian. Outside the hospitals, the incidence of the two types is almost equal; quartan is rare. The benign tertian curve has its maximum rise in September. *W. F.*

HELFFERICH (W. M. G.). Merkwaardige uitkomsten van een malariaonderzoek in de Onderafdeeling Dairilanden (Residentie Tapanoeli). [**Results of a Malaria Investigation in the Dairilands Subdivision.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1934. Oct. 23. Vol. 74. No. 22. pp. 1438–1446.

The chief result of this investigation in Sumatra was the unusual finding that the parasite index was often much higher than the spleen index and that this condition was a permanent one.

It is only in recent years that the Dairilands district has been easily accessible. The climate is a typical hill climate (altitude of 700–1,200 metres) with wide variation of day and night temperature and a heavy rainfall (3,000 mm.). Malaria is rife and appears to be a true chronic endemic malaria without any seasonal prevalence. An example of its prevalence is furnished from the garrison of the capital—58 cases in 1933 for an average strength of 56, 38 cases in women and children with average strength of 93, and 9 cases among prisoners with average strength of 9. In type the malaria was benign, mainly tertian, with only one or two days fever and little effect upon health. The carrier was probably a zoophile type or at least an out-of-doors mosquito. Thus although an energetic search was made at evening the results were always disappointing and only 43 were caught in houses, of which 29 were *A. maculatus*. On the contrary the catch in cow and buffalo stables was 842 for the same period of time and in this number were included 490 *A. maculatus* and 251 *A. fuliginosus typicus*. On several occasions parasite and spleen indices were taken and the blood smears examined at the official laboratory. These gave a low spleen index with a high, often much higher, parasite index. In the later examinations all age groups were represented, small children, school

children and adults. The general result differed, then, from that propounded for a chronic endemic malaria by SCHÜFFNER and SWELLENGREBEL, which should show a high spleen index in all age groups, and a much lower parasite index becoming steadily lower from the child to the adult. In the present case no parasite immunity with age can be invoked because the condition was identical in children and adults. It seems to the author that the condition in the area under investigation must point to a low virulence of the malaria parasite and a tendency to commensalism, while these features again may be associated with height above sea level. The possibility of a strain resistant to medication may also be taken into consideration. *W. F. Harvey.*

RUSSELL (Paul F.). **Malaria and Culicidae in the Philippine Islands: History and Critical Bibliography, 1898 to 1933.**—*Philippine Is. Dept. of Agric. & Commerce, Manila, Tech. Bull. No. 1.* 1934. June 23. 115 pp. With 3 text figs. & 8 plates (2 maps).

———. **A Neglected Early Reference to the Malaria Vector in the Philippines.**—*Amer. Jl. Trop. Med.* 1934. July. Vol. 14. No. 4. pp. 339–342. [10 refs.]

Malaria cannot be reduced without anti-larval control. Most of the facts given in this compilation have already been published in articles which have been summarized in this *Bulletin.*

The paper was prepared as a part of the program of Malaria Investigations, Bureau of Science, Manila, of which the author is chief, and which is jointly supported by the Bureau and by the International Health Division of the Rockefeller Foundation. The study is limited to the years 1898–1933, which constitute the American epoch in the islands. Up to that time, research studies in tropical medicine had been practically nonexistent, microscopes were rare, and nothing was known about the mosquitoes. It appears that malaria was indigenous when Magellan came in 1521, but that it was rarely as deadly as in Java or the Malay Peninsula. From 1898 until 1903, the admission rates for malaria among American white troops were between 450 and 750 per mille; from 1904 to 1908 they were between 200 and 300; from 1909 to 1913, they were between 86 and 186; from 1924 to 1928 they were between 13 and 32. Improved mosquito nets and the strictness with which their use was enforced appear to have been important factors in this reduction of malaria in the army. "From Lippincott, first to advocate nets as a protection against malaria, and Whitmore first to incriminate the stream-breeding anopheles, to the present excellent malaria-control programme at Fort Stotzenburg, the Army's record has been one of outstanding achievement." WHITMORE in 1904 found 30 per cent. of the stream-breeding "*Myzomyia funesta*" (? *minimus*) infected with malaria. Before this it was supposed that all malaria-carrying anopheles bred in swamps. MANALANG considers that the local *minimus* is identical with *A. funestus* but, according to KING, the *funestus-minimus* subgroup of the Philippines is made up of (1) *A. filipinae* Manalang 1930, (2) *A. mangyanus* Banks 1906, (3) *A. minimus* Ludlow.

In 1913, arrangements were made for the sale of quinine at a very low rate, it was also distributed free of charge, but, in 1915, after millions of tablets had been distributed, the Health Service reported that it had been a failure. MANALANG, however, still advocates "quininization or, better still, the use of plasmoquine compounds"

because he considers Paris green ineffective. The author does not agree with this opinion, " all available evidence indicates that drug control of malaria is as impossible from a practical standpoint in the Philippines as elsewhere. Moreover, it is very expensive, not only in the cost of drugs but also in salaries of those who must distribute it dose by dose. . . . But in many places throughout the Islands, Paris green control is thoroughly feasible. . . . In Calauan between 1924 and 1926, . . . the reduction in hospital costs alone was ten times greater than the actual cost of malaria control by Paris green. . . . Mosquito nets, therapeutic drugs (that is, quinine, chinoplasmin, and atabrine), and an attack on the larvae of the *funestus-minimus* subgroup will gradually subdue this disease in the Philippines. There is no evidence that without larval control malaria rates can be lowered much below their present level in these Islands. Paris green is the cheapest and most effective larvicide." The following insecticide spray has been found most useful ; mix together and shake frequently 60 grams of fresh powdered pyrethrum and 120 cc. of chloroform, filter through a Buchner funnel and add 1,000 cc. kerosene to the filtrate. " There is no evidence at all that bats, larvivorous fish, clover, *Chara*, or cannibalistic larvae have had or could have any virtue in the control of malaria in the Philippines." Keys for the identification of the adults and larvae of the Philippine anopheles are published with this paper in the form of two large charts. *W. F.*

LAUREL (Alberto G.). **Feeding Activities of Some Philippine Anopheles.** —Reprinted from *Rev. Filipina Med. y Farmacia.* 1934. July. Vol. 25. No. 7. pp. 286–297. [34 refs.]

The results of precipitin tests performed on Philippine anopheles.

A. minimus enters houses to feed, but never remains there during the day. The author does not think that there are separate androphilous and zoophilous strains of *A. minimus*. " More likely our *minimus* consists of a mixed strain, and while it is generally inclined to feed on man it will also feed on animals when accessible." *A. maculatus* feeds chiefly on animals ; of 338 caught during the daytime, 4 were positive for human blood and 241 for cattle blood (see EJERCITO below). Examinations of fresh-water breeding *ludlowi* showed positive reactions for cattle blood, but not for human. Salt water *ludlowi*, on the other hand, showed avidity for human blood, but they do not transmit malaria in the Philippines. *W. F.*

EJERCITO (Antonio). *Anopheles maculatus* **Theobald, Another Malaria Vector in the Philippines.**—*Jl. Philippine Islands Med. Assoc.* 1934. Sept. Vol. 14. No. 9. pp. 342–346.

A. maculatus, in the Philippines, is zoophilous, and unimportant in comparison with *A. minimus*. [See LAUREL above.]

A. maculatus is not so widely distributed in the Philippines as *A. minimus*. In some places where precipitin tests were made, it was found that over 98 per cent. of the *A. maculatus* had fed on cow's blood and only about 2 per cent. on human blood. At Bagiuo, 4,300 feet above sea level, *A. maculatus* is plentiful but there is no malarial transmission. The natural infection rate of *A. maculatus* is 0·3 per cent. The experimental infection rate is 5·26 per cent. It is much less important than *A. minimus* as a transmitter of malaria in the Philippines. *W. F.*

ROBERTSON (R. C.) & HU (Stephen M. K.) with Illustrations by R. V. DENT. **Mosquito Control. An Entomological Field Research Station for Mosquito Study in the Shanghai District.**—Reprinted from *China Jl.* 1934. June. Vol. 20. No. 6. pp. 344–356. With 1 map, 16 figs. on 8 plates & 1 diagram.

This is an account of the work done at the Kaochiau Field Laboratory written for the general public of Shanghai.

"The object of this paper is to place the main facts regarding the prevalence of disease-carrying mosquitoes in the Shanghai area before the general public. . . . Is the risk of contracting malaria serious in Shanghai or not?" A field laboratory was established at Kaochiau in the spring of 1933 as a branch of the Entomological Research of the Henry Lester Institute, and the greater part of this paper consists of a description of the work which is done there. It is illustrated by excellent photographs of the resting places of adult mosquitoes, and of the methods of catching them. *A. hyrcanus* Pallas var. *sinensis* Wiedemann was the only anopheline found. *W. F.*

PARSA (Seyfolah). Contribution à l'étude du paludisme en Perse. [**Malaria in Persia.**]—44 pp. [38 refs.] 1933. Paris: Les Éditions Véga, 43 rue Madame.

Malaria is widespread in Persia, but no organized attempt to control it has ever been undertaken.

After the capture of Khoram-Abad, in Luristan, from the insurgents, epidemics of disease, especially malaria, were so severe that military undertakings were held up for a period of six months. The surrounding country was peopled by nomads living on the verge of starvation in conditions of filth and squalor. The town itself was grossly insanitary, and was little more than a heap of ruins owing to the frequent attacks of tribesmen bent on loot. The measures undertaken were the treatment of the sick, both civil and military, and quinine prophylaxis. In addition, the government made a road connecting two important centres which passed through Khoram-Abad. The making of this road gave work to the nomad tribes, and efforts are being made to induce them to abandon their wandering life and to settle on the land bordering this road, where they can be looked after and lead a more sanitary life.

W. F.

COLLIGNON (E.). Observations sur la lutte antipaludique en 1933 dans le département d'Alger. [**Anti-Malaria Work in Algeria, 1933.**]—*Arch. Inst. Pasteur d'Algérie.* 1934. June. Vol. 12. No. 2. pp. 209–226. With 14 figs. on 7 plates.

AMBIALET (R.). Observations générales sur la campagne antipaludique de 1933 dans le département de Constantine.—*Ibid.* pp. 227–246. With 2 graphs & 10 figs. on 5 plates.

GOUGET (R.). La campagne antipaludique de 1933 dans le département d'Oran.—*Ibid.* pp. 247–254. With 6 figs. on 3 plates.

Quinine appears to be the main weapon in prevention.

The principal anophelines of Algeria are *A. maculipennis*, *A. marteri* and *A. hispaniola*. *A. maculipennis* breeds in pools found in river beds, in irrigation channels, ditches, and casual collections of water. It is the anopheline of the plains and alluvial valleys. The water

in which it breeds is sweet or slightly salt, lying on a muddy bottom, stagnant or slowly moving, and with abundant vegetation. Breeding is at its height in spring. This anopheline is the most important vector in the country. *A. marteri* is found in clear water without vegetation, in the pools of mountain streams with rocky or sandy bottoms. The streams dry up in May and this species disappears. *A. hispaniola* breeds in the summer, in the streams of upland valleys containing green algae. It does not appear to be important as a vector of malaria. Anti-malaria work has been based upon the quinine prophylaxis of native children and anti-larval operations. All native children under the age of 15 are given quinine from the beginning of May until the end of November. The younger ones are given capsules, chocolate covered pills, or aristoquine (tasteless carbonic ester of quinine). The drug is well taken and, in very malarious villages, it produces an extraordinary change in the appearance of the children in the course of a few weeks. The parents are most grateful to the doctors. The quinine does not get rid of the infection, but it does get rid of the danger ; it saves the lives of the children until they reach a condition of premunition, which is the goal to be aimed at with natives in a malarious country. The antilarval measures which were on a 2 kilometre radius round settlements, consisted of drainage, clearing, oiling and the introduction of gambusia. *W. F.*

VAN NITSEN (R.). Les indices endémiques palustres à Panda. [**Malaria Endemic Index at Panda, Katanga.**]—*Bull. Méd. du Katanga.* 1933. Vol. 10. No. 5. pp. 127, 129, 131, 133, 135, 137.

An example of high endemicity with very little illness from malaria. The parasitic index reaches its highest point, 96 per cent., in children between 3 and 4 years of age. The maximum gametocyte index, 55 per cent., is reached between 2 and 3. The maximum splenic index, 45 per cent., is found between the ages of 4 and 5. Most of the infections are subtertian. In spite of this high endemicity, there is little illness and the mortality is low. The labourers and their children are well nourished. Natives of Ruanda who have emigrated to Katanga show a greater sensibility to malaria than the other tribes of the Congo, and it is interesting to find that this susceptibility appears to be transmitted to their children who are born in Katanga. *W. F.*

VINCKE (I.) & HENRARD (C.). Note sur la lutte antipaludique à Léopoldville. [**The Antimalaria Campaign at Leopoldville.**]—*Ann Soc. Belge de Méd. Trop.* 1934. June 30. Vol. 14. No. 2. pp. 203–217.

A. gambiae, the important carrier, breeds in collections of rain water during the wet weather and in the rivers all the year round.

A. gambiae is the commonest species of anopheles in Leopoldville, and it is also the most important carrier. During the wet weather it breeds in the pools of rain water which collect in holes and depressions, many of them made by man. It breeds all the year round in the river Congo and in the streams which run into it ; in the dry weather when temporary collections have disappeared, it breeds in the pools left in the

beds of the sinking rivers. The average infective index of this mosquito throughout the year was 8·6 per cent. ; it rose as high as 21·4 per cent. during the January rains ; and in the dry, cold weather of June and July it fell to 2·6. In July, the low temperature appeared to have retarded the development of the parasites for no gland infections were found. Another carrier, but one of far less importance, is *A. moucheti*. Many other species occur in Leopoldville ; *A. nili*, *A. funestus* and *A. rufipes* though they are carriers, are very rare, and *A. mauritianus* though common, does not appear to be a carrier. *W. F.*

HOFFMANN (Carlos C.). Contribución al conocimiento del paludismo en la península de Yucatán. [**Malaria in Yucatán.**] Reprinted from *Bol. Inst. de Higiene*. 1934. 2nd Ser. Vol. 2. No. 1. 57 pp. With 29 figs. (2 coloured maps).

This monograph gives a clear and succinct account of malaria in the Peninsula of Yucatán. The author, who is head of the Department of Parasitology at the Institute of Hygiene, briefly describes the geography and the factors influencing the development of anopheles in the peninsula, with accompanying maps and photographs of breeding sites and charts of the rainfall from 1923 onwards.

Five species of Anopheles are found, namely, *A. albimanus*, *A. pseudopunctipennis*, *A. crucians*, *A. vestitipennis* and *A. punctimacula* ; the first is the most dangerous. Each is described in detail together with its favourite haunts, and a diagnostic key is appended.

Then follow remarks on the prevalence of infection on certain estates, these are mainly of local interest but an instance or two may be given, On one estate 60 persons were examined and 59 had enlarged spleen, in 20 it was just palpable, and in one only was it very large. Parasites were found in four only among the 60—three among 21 children and one among 39 adults. Elsewhere, among 83 re-examined after the 1927 epidemic 46 had enlarged spleens and 62 showed parasites. *P. falciparum* was found in 53, *P. vivax* in 26, *P. malariae* in 9 ; *P. falciparum* and *P. vivax* together in 17. The epidemic had been a severe one. In November, 1,916 patients were treated, in December 2,405 and in January 2,272, or 6,593 in the three months. The usual measures were undertaken—destruction of mosquitoes, elimination of breeding sites, etc. *H. H. S.*

MARTINI & ZOTTA. Races d'*A. maculipennis* en Roumanie. Rapport sur un voyage d'étude effectué à travers la Roumanie pendant les mois d'août et de septembre 1933. (Sous les auspices de l'Organisation d'Hygiène de la Société des Nations.) [**A Study Tour in Rumania during August and September 1933. Races of** *A. maculipennis*.]—*Arch. Roumaines Path. Expérim. et Microbiol.* Paris. 1934. June. Vol. 7. No. 2. pp. 135–209. With 6 figs., 6 charts & 2 maps.

The main object of this tour was to study the distribution of the different races of *A. maculipennis* and to determine the relation of this distribution to the prevalence of malaria.

The authors found that the situation resembled almost exactly that obtaining in Germany. *A. messeae* was found to be the mosquito of the broad sweet-water regions, lakes, and rivers. *A. atroparvus* was particularly common in the salt-water lakes and ponds which lie just

at the back of the shore, and are separated from the sea by banks of sand and narrow tongues of land. This mosquito is also found in collections of brackish water in the interior. *A. maculipennis maculipennis* constitutes a large proportion of the mosquitoes of the higher regions and it is sometimes found mixed with *A. messeae* or *A. atroparvus*. In the neighbourhood of Constantza, there are several coastal lakes which are separated from the Black Sea by a strip of sand. These lakes appear to be similar to one another in every way except that some of them contain sweet water while the others are brackish. The anopheline fauna differ sharply, *A. messeae* breeds in the sweet water lakes, while *A. atroparvus* is the predominant anopheline in the salt lakes. Along the shores of the Black Sea, *A. elutus* is sometimes found. *A. labranchiae* was not found by the authors in Rumania.

Much of the delta of the Danube consists of the " Plaur," which is composed of layers of tangled roots, rushes and the like, with water flowing underneath. In many places the Plaur is so thick that cattle wander over it ; in other places, it is spongy and quaking. There are swarms of mosquitoes in the delta and the cattle come home at night to crowd round a fire in the village. In spite of this, there is very little malaria. The authors ascribe this absence of malaria to three causes : (1) abundant food for the population, (2) large herds of cattle, (3) the use of mosquito-nets and other methods of protection against mosquitoes. The most dangerous race of *A. maculipennis* appears to be *A. elutus*. A village which was annihilated by malaria was found to be situated near breeding grounds of this mosquito. The regions where *A. atroparvus* was prevalent were only a little less malarious. There was little malaria in the *A. messeae* regions and least of all in the places where *A. maculipennis maculipennis* flourished. The authors state, however, that under unfavourable conditions and in the absence of screening, widespread infection with benign tertian, and some cases with subtertian, may occur, even in places where the only variety is *A. messeae*. They were not able to find in Rumania examples of subtertian malaria decimating the population in regions where only *atroparvus*, *messeae* and *maculipennis* were found. The grave epidemic which occurred in the delta of the Danube, after the war, showed that this area was not free from serious malaria under all circumstances. This post-war epidemic was principally due to the destruction of the cattle by the troops, and to the consequent absence of deviation of the mosquitoes from man. *W. F.*

ILVENTO (A.). **The Reclamation of the Pontine Marshes.**—*Quart. Bull. Health Organisation, League of Nations.* Geneva. 1934. June. Vol. 3. No. 2. pp. 157–201. With 18 figs. & 1 map.

" In 1926, the great ' back to the land ' movement was initiated by the Duce. . . . In the Mussolini Act of December 24th 1928 . . . large areas were to be comprehensively reclaimed at a cost of 7,000 million lire."

The first part of this article is concerned with the geography and history of the Pontine Marshes, and with the attempts to colonize it which have been made for hundreds of years (see CELLI, this *Bulletin*, Vol. 31, p. 220). The author then describes the resolute way in which the problem has been attacked, and how the difficulties have been overcome.

The basic survey which forms the foundation of the present drainage work in the Pontine region was made in 1918 by officials of the Office of Works. A start was made in 1924, by the end of 1933 all natural water-courses had been regulated, and throughout almost the whole region floods and stagnant pools were eliminated. The owners of the land hesitated to sink much capital in the inauguration of new farming methods and in building new houses; consequently the Duce called upon the National Ex-Servicemen's Association to carry out the program of agricultural land-improvement and re-population of the zone. This association provided considerable funds "and a still greater asset in the persons of technical experts of long experience." In 1931, 18,000 hectares of land were given to the Association. The canalization of the upper waters was already completed and these were collected into the great Mussolini drainage canal and led down to the sea. The land was divided into holdings, 515 farm-houses were built, and the peasants were instructed in rational farming methods so that each family might become the owner of its farm within the time-limit of one year. "Each farm-building includes a dwelling-house built on a damp-course and comprising a ground-floor kitchen and storeroom and one upper storey with three to five bedrooms and living-rooms, the doors and windows screened against flies and mosquitoes; a stable for 8 to 10 head of livestock . . .; a chicken-run and pigsty; a well of fresh water for domestic use; a cesspool and a manure-heap. . . . The National Association bears the cost of preparing the soil of each farm, of buildings, live and dead stock, and the farm-tracks. . . . The farm is handed over to the peasant immediately all this work has been completed."

Workers' Hutment Village erected by the National Ex-Servicemen's Association to house the workmen engaged in preparing the peasants' farms in the Agro Pontino.

[Reproduced from the *Quarterly Bulletin of the Health Organisation, League of Nations.*]

An army of workmen was employed. At first they were taken to their work daily in motor-coaches, but later, collections of screened huts, or barracks, were constructed (as shown in the photograph) for groups of 500 to 2,000 workmen, where their health was properly looked after, and their happiness and recreation cared for. Then came the peasants, and soon a town grew up. In December 1932, the Commune of Littoria was officially constituted. The square in the centre of the town was formerly one of the most malaria-ridden spots in the region. The Duce declared in his speech delivered at the inauguration of the Commune, " This is a red-letter day in the history of *Agro Pontino*. It is a day of triumph for the whole nation. What 25 centuries attempted in vain we now see accomplished before our eyes. . . . On October 28th, 1933, we shall inaugurate 981 new homes for settlers ; on April 21st, 1934, we shall inaugurate the new Commune of Sabaudia, and on October 28th, 1934, the third Commune—Pontinia. . . Formerly, to find work we had to pass the Alps or cross the ocean. Now the land is at our doors, within half-an-hour of Rome."

The number of persons resident in the Agro Pontino was 1,800 in July 1924, 12,000 in July 1932, 40,430 in July 1933. In 1933, all health services were placed under the Italian Red Cross. Quinine prophylaxis is chiefly used for persons not permanently resident in the territory. It always prevents fever and pernicious malaria, and is therefore in great favour. Under the present conditions of concentration, malaria can be diagnosed early and the patients can be treated in the new local hospitals. Carriers of infection are followed up and treated. Adult anopheles are destroyed in the houses with paraffin atomizers, smoke bombs and the like. The increase of cattle has deviated anopheles in some areas, and drainage, oiling and Paris green have lessened their numbers. The antimosquito squads carry out the latter measures for a radius of 1,000 metres (0·625 miles) round all dwellings. In 1933, though the number of people exposed to infection had trebled, the morbidity rate fell to 2·09 per cent., and the death rate to 0·34 per thousand.

On August 4th 1933, the Duce inaugurated a seaside colony at Torre Olevola for the children of the Littoria settlers. This place—3 kilometres from Terracina—was formerly well known for its amazing marsh landscape of dead waters and gigantic water-lilies, and was completely in the grip of malaria. " The children immensely enjoyed their life in the colony ; a number of malaria cases were cured, and no new cases occurred." The author concludes that there are only two achievements which " can be approximated to the new civilized life in the malarial lands of Italy . . . the reclamation of the Panama Canal Zone and the draining of the Zuider Zee." *W. F.*

VERSLAGEN EN MEDEDEELINGEN BETREFFENDE DE VOLKSGEZONDHEID. 1934. June. 36 pp. With 2 figs.—Verslag over de jaren 1932 en 1933 van de malaria-comissie uit den gezondheidsraad. [**Report for 1932 and 1933 of the Malaria Commission of the Sanitary Board.**]

This commission in its several reports represents the facts and figures, with their analysis, of the campaign against malaria in Holland. The chief malaria station was at Medemblik and much useful information has been collected, especially on the subjects of the value of an anti-larval campaign, the first three years of land reclamation of the

Wieringermeer area and attempts at finding a suitable cheap and efficient insecticide for use in houses.

The antilarval campaign in Medemblik during the years 1927 to 1931 was successful in reducing anopheles to a figure 4 to 5 times as low as that in the area outside the field of operations. With the termination of the operations the anopheles density rose in 1932 and 1933 to a much higher level in Medemblik than before. The campaign, then, had produced its effect and yet it was found insufficient completely to prevent the rise in malaria between 1929 and 1931. When the cost of the procedure, at one florin per inhabitant, is taken into account the conclusion is irresistible that large scale operations are inadvisable in a watery land like Holland where malaria is of benign type.

Observations in the reclaimed area of Wieringermeer are very interesting. Here most of the ditches were too salt to serve as breeding places and in the polder the density of mosquitoes, determined from the mosquito population of the test stables, at a distance of 3, 5 and 10 kilometres from the old land was in 1932 one quarter of the density of those in the corresponding stables at Medemblik, which by that time was no longer protected by antilarval measures. But the natural method of protection in the Wieringermeer polder was able to effect nothing better than the artificial in Medemblik. An important observation made in the Wieringermeer area was as to the distance of flight of mosquitoes, which was shown could be to 9 and 14 kilometres. This question of distance is supposed to have a bearing upon the value or want of value of antilarval measures in a given area, when that area is surrounded by others in which no measures are taken. When, however, the point was put to actual test, as it was for the 3-kilometre long village Wormerveer with an epidemic of malaria in the northern kilometre, it was found that no indication of spread of malaria to the middle and southerly portions was forthcoming. Was this due to the fact that infected mosquitoes, which are sick mosquitoes, cannot fly far or was it that mosquitoes generally do not really fly to any great distance? The latter supposition seems the more probable. Mosquitoes fly little, rest in houses and at the most find their way only into an adjacent house. Thus an argument is found for the utility, on a small scale at least, of antilarval measures in spite of the contrary experience at Medemblik and Wieringermeer.

An active search was made for a spray insecticide, as this is regarded as a most useful antimalarial measure for dwelling houses. The formula arrived at for use in dwelling houses was :—petroleum 1,000 cc.; pyrethrum extract 5 gm; sassafrass oil 5 cc.; methylsalicylate 20 cc.; and for stables :—petroleum 550 cc.; vaseline oil 450 cc.; pyrethrum extract 10 gm.; sassafrass oil 10 cc.; methylsalicylate 20 cc.

Other questions which received attention were the bearing of races of *Anopheles maculipennis*, small type and large type, upon malaria; the separation of *Plasmodium vivax* into races, as exemplified by the Madagascar and the Dutch races; the treatment of tertian malaria with plasmoquine and Henry's diagnostic serum reaction. *W. F. Harvey.*

SOUTHERN MEDICAL JOURNAL. 1934. May, June & July. Vol. 27. Nos. 5, 6 & 7. pp. 448–466; 546–561; 642–657. **Symposium on Malaria. Parts 1, 2 & 3.** [19 papers.]

The Chairman, Dr. C. F. CRAIG, opened the Symposium with an address on certain unsolved problems in malaria. He drew special

attention to the following :—(1) The species of malaria plasmodia : JAMES, NICOL and SHUTE have shown that *P. ovale* is a valid species, and further research may show that there are yet others. He stated that *P. ovale* was first described by himself in 1900 ; but it was not named until 1922 when STEPHENS observed it. (2) The morphological identity of some of the malaria parasites of apes and monkeys with those of man, and the successful transmission of monkey malaria to man by KNOWLES and DAS GUPTA, emphasizes the necessity for further study of the relationship of the plasmodia of man and monkeys. (3) Perhaps the most important of the unsolved problems concerns the cause of long term relapses, and the origin of gametocytes. (4) It has recently been shown that other genera than *Aëdes* can transmit yellow fever. Much more work is necessary before we can be sure that anopheline mosquitoes are the only transmitters of malarial infections. (5) The unusually rapid spread of malaria in some epidemics has been very difficult to understand, and it is possible that mechanical transmission by mosquitoes or other biting insects sometimes occurs, as it occurs in trypanosomiasis and dengue fever. (6) The study of immunity in malaria offers a wide field for research.

Drs. G. E. RILEY, E. C. FAUST, and T. H. D. GRIFFITTS, gave a survey of recent work in the epidemiology of malaria. They dealt with the work of GIGLIOLI in British Guiana, with the study of the different races of *A. maculipennis* in Europe, with the investigation of monkey malaria in India, and with work in other parts of the world which has been summarized in this *Bulletin*. Drs. E. C. FAUST and C. F. DIBOLL have compiled the death rates due to malaria in the 14 southern States. The rate was 8 per 100,000 in 1925, it rose gradually to 11·4 in 1928, and has since declined to 6·8 in 1932. The 1933 figures, which are not yet complete, indicate that the rate is rising again.

Dr. E. H. HINMAN contributed some interesting observations on the hibernation of *A. quadrimaculatus*. It is generally accepted that this species is active throughout the winter, but at Fort Jackson in an abandoned fort on the west bank of the Mississippi, 65 miles below New Orleans, Dr. Hinman found that vast numbers collected for shelter. Behind the fort there are wide stretches of salt marsh where *A. crucians* and *A. atropos* breed, but not *A. quadrimaculatus*. In the summer, a few *A. quadrimaculatus* were found in the fort, but in November there were millions ; some rooms contained more than 10,000. In December they were even more numerous. In January and February there was a considerable reduction in the numbers, and in the latter part of March it was difficult to find any specimens. A similar sheltering or hibernation of *A. quadrimaculatus* has been found nowhere else. The mosquitoes breeding in the adjacent salt marsh belonged to other species, and did not shelter in the fort ; the *A. quadrimaculatus* apparently came from distant breeding places.

Dr. T. H. D. GRIFFITTS examined the blood of children in 79 white schools and 57 negro schools in Florida. Parasites were present in 3·8 per cent. of the white children and 9·7 of the black children. Of the infections in white children, 47 per cent. were due to *P. falciparum* and 30 per cent. to *P. vivax* ; in black children the proportion was *P. falciparum* 62, and *P. vivax* 23 per cent.

Dr. K. DRENSKY and Dr. R. K. COLLINS recorded the interesting results of their observations on the winter infection rates in *A. maculipennis* and *A. superpictus* in Bulgaria. SELLA in Italy, SWELLENGREBEL

in Holland, and WENYON in Macedonia, have found infections among hibernating mosquitoes. It has been shown experimentally that low temperatures retard the development of the parasite in the mosquito, but they do not kill it, and with the return of warm weather development proceeds anew. It is common knowledge that in certain parts of Bulgaria it is not unusual for babies born in the winter to suffer from malaria in the spring. The authors dissected a number of *A. maculipennis* and *A. superpictus* caught in the Petritch district of Bulgaria between February 7 and April 20, 1933. These mosquitoes were caught in barns; they are not found in houses during the winter. Among 609 *A. maculipennus* 11, or 1·8 per cent., were infected, mostly with sporozoites, and among 208 *A. superpictus*, 2, or 0·9 per cent., were infected with oöcysts. Precipitin tests made with mosquitoes which contained blood showed that *A. maculipennis* fed on man even during the hibernating period, and the authors conclude that these infections "may not be unimportant in explaining the spring rise of malaria which is so characteristic of the disease in the area."

Doctors H. E. MELENEY and J. A. CRABTREE made a survey of the rural houses of Lake County, Tennessee, during 1931. Most of these houses had been screened between 1927 and 1930, but the financial depression made it impossible to complete the 15 per cent. remaining unscreened, or to do any repairs. The data collected indicate that "although a tremendous effort had been expended by the county health department, the degree of protection afforded to the people from mosquitoes, even if they used what protection they had, was far from complete. . . . To what degree the imperfectly screened houses acted as traps in which infected mosquitoes might incubate and infect others is impossible to state. . . . The conclusion is reached that the screening and mosquito-proofing in Lake County probably were responsible for the greater reduction in incidence of malaria . . . its incompleteness and its unsatisfactory maintenance by the people have steadily decreased its value."

Dr. H. C. CLARK gave a review of malaria research during the year 1932–1933. He drew attention to the wide range of flight of some anopheles. This called for larval control over a longer radius than was formerly thought necessary, and greatly increased the expense. More attention should be paid to the screening of houses, and the treatment of carriers. Dr. Dalferes P. CURRY read a most interesting paper on the periodic long-distance flights of *P. albimanus*, Wied. The great artificial Gatun Lake, 165 square miles in extent, was completed in 1913 as part of the lock-system of the Panama Canal. It developed a flora of water-hyacinth (*Piaropus crassipes* and *P. azurcus*) and floating water-lettuce (*Pistia stratiotes*). The hyacinth, an inconvenience to navigation, has been controlled by arsenic spraying; the Pistia has disappeared spontaneously. In recent years, two other aquatic plants have invaded the lake. These are *Utricularia mixta*, a bladder-wort, and several species of Chara. (Certain species of Chara, such as *C. foetida*, have been said to be inimical to mosquito breeding, but recent investigations indicate that they favour the development of mosquitoes wherever they grow.) The level of the lake sinks at end of the dry season, and the tops of these weeds come to the surface where they form a tangled mat in which incredible numbers of *A. albitarsis* and *A. albimanus* breed. *A. albitarsis* breeds in the Utricularia, it is not androphilous. *A. albimanus* breeds in the exposed patches of

Chara. In the hot, still weather, just before the rains, the sanitated areas of the Canal Zone are visited annually by flights of *A. albimanus.* that have flown 12 miles or more from Gatun Lake. A sharp rise in the malaria rate follows the flight. Formerly the Canal Zone was depopulated of all inhabitants except government employees, and these were concentrated in a few towns and villages ; but repopulation by agricultural settlers (mostly West Indian negroes) has been allowed recently, and it is probable that the anopheles rest and feed in the cabins of these settlers during their long flight, for many of them are already infected when they reach the towns. " The Canal Zone, contrary to widespread opinion, and despite the great effort and large sums spent upon it, has not achieved complete mastery of its malaria problem . . . the excellent screening of the houses of the employees . . . is still a vital element in the protection of the health of the community. . . . It is believed that future control of Gatun Lake levels within smaller ranges of fluctuation, by means of a new storage lake now being created in the upper Chagres River Valley, may, to some degree, lessen the appearance of vegetation at the surface of Gatun Lake and, consequently, the production of anopheles."

The remainder of the papers read before the National Malaria Committee dealt with the malaria control work which had been done during the year in the several southern states. These are noted by title only on p. 146–8. Although funds had been reduced in many instances, a considerable amount of drainage work was done in several of the states by unemployed men who were engaged on relief work.

W. F.

APPELBAUM (Emanuel) & GELFAND (Ben B.). **The Artificial Transmission of Malaria among Intravenous Diacetylmorphine Addicts. A Preliminary Note on the Use of Atabrine in Malaria.**—*Jl. Amer. Med. Assoc.* 1934. May 19. Vol. 102. No 20. pp. 1664–1670. With 2 figs. [24 refs.]

This paper contains some interesting observations on the eye changes in cases of severe malaria among addicts.

The authors report 10 cases of malaria among drug addicts admitted to the Bellevue Hospital, New York, during the last six months. In most cases there was evidence that the disease had been contracted by sharing the hypodermic syringe with some other addict. The drug in common use by addicts is diacetyl morphine (heroin). In all the cases except one, the patients were severely ill. They were very anaemic ; in only one was the red blood count above 4,000,000. Three of the cases were quartan and seven were subtertian. Six of the latter were suffering from cerebral malaria, and five of them died ; one of the three quartan patients also died—making six deaths in 10 cases. The eyes were carefully examined in all cases. " Raynaud in 1892 . . . emphasized that the most common pathologic finding is hyperaemia of the disks and that this change is in most instances responsible for the transitory amblyopia" in cases of severe malaria. The hyperaemia of the finer vessels gives the disks a rosy brilliant appearance ; this was observed in four of the patients. Retinal haemorrhages were seen in three. The authors were favourably impressed by atebrin.

W. F.

BRADLEY (Jas. A.). **Intravenous Transmission of Malaria in Drug Addicts.**—*Jl. Trop. Med. & Hyg.* 1934. Aug. 15. Vol. 37. No. 16. pp. 241–244. [11 refs.]

——. **Transmission of Malaria in Drug Addicts by Intravenous Use of Narcotics.**—*Amer. Jl. Trop. Med.* 1934. July. Vol. 14. No. 4. pp. 319–323.

During the eleven months October 31st 1932 to September 30th 1933, 50 cases of malaria in drug addicts were admitted to the Charity Hospital of Louisiana, New Orleans, and 10 of them died. Evidence was obtained which showed that the infection had been transmitted by the syringe used for intravenous inoculation of the drug. [See also this *Bulletin*, Vol. 27, p. 202 ; Vol. 31, pp. 164–5 ; 419 ; 689.] *W. F.*

WILSON (D. Bagster) & WILSON (Margaret E.). **On the Significance of Splenic Enlargement in East Africa.**—*East African Med. Jl.* 1934. Aug. Vol. 11. No. 5. pp. 156–165. With 2 charts.

The spleen rate alone is not a sure index of the malariousness of a given locality. For example, control in Tanga is so complete that no anopheles can be found in the houses, yet, owing to the migratory population becoming infected in other towns, the spleen rate is quite high. The spleen rate follows the parasite rate, and both decline as immunity rises, but a given degree of enlargement does not always mean the same degree of immunity. At the time when, judging from the infestation rates, immunity appears to be highest, that is between the ages of 15 and 30, the spleen rate and the degree of spleen enlargement are at their lowest. Individuals at this age can travel about with a freedom from malaria which is not possessed by persons of other ages. *W. F.*

HINGST (Hans E.). *Plasmodium falciparum* **Welch, 1897. Does Direct Division of the Parasite precede Schizogony ?**—*Amer. Jl. Trop. Med.* 1934. July. Vol. 14. No. 4. pp. 325–328. With 1 fig.

The author raises again the question of the possibility of multiplication of the rings of *Plasmodium falciparum* by binary fission. He thinks that the presence in a red cell of 2, 4 and 8 rings cannot be explained in any other way. It is suggested that at the 4 stage each parasite may then become a schizont giving rise to 8 merozoites or a total of 32 in the cell. Certain photographs of red cells containing two or more parasites and single parasites with two chromatin dots are reproduced in support of the theory. *C. M. Wenyon.*

MÜHLENS (P.). Ueber *Plasmodium ovale* (Stephens). [*Plasmodium ovale* (**Stephens**).]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Sept. Vol. 38. No. 9. pp. 367–374. With 21 coloured figs. on 1 plate & 10 text figs. [15 refs.]

The paper describes 4 cases of infection with *Plasmodium ovale*. Three were from West Africa and one from Western South America. In all cases the fever was of the tertian type. The characters of the parasite are illustrated in a coloured plate. As regards the individuality of this parasite the author thinks the final answer has not yet been given, though he inclines to the view that it does represent a fourth species as maintained by observers in England. *C. M. W.*

TONKING (H. D.). **A Case of *Plasmodium ovale* in an East African Native.**—*East African Med. Jl.* 1934. Aug. Vol. 11. No. 5. p. 166.

Describes the distinguishing features of the parasites in another East African case.

STEPHENS's case (1922) came from East Africa [see this *Bulletin*, Vol. 20, p. 296]. The case here described came from the neighbourhood of Nairobi. The points observed were :—Almost every young form showed plentiful Schüffner's dots ; half-grown parasites looked like *P. malariae* except for these dots. In parasites with the nucleus divided into three or more pieces, a large number of the containing red cells were oval in shape, and one end of the cell was drawn out into fine points. The parasite at this stage of growth was smaller than *P. vivax* of the same age. The most striking differences from *P. malariae* and *P. vivax* were seen in the sporulating forms, each of which contained only eight merozoites and a central mass of pigment in a cell with a tremendous number of Schüffner's dots. *W. F.*

HOPKINS (H. O.). **A Defibrinated Blood-Film Concentration Method for the Diagnosis of Malaria.**—*Malayan Med. Jl.* 1933. Dec. Vol. 8. No. 4. pp. 275–276.

In order to obviate certain disadvantages of the usual thick-film for malarial diagnosis, notably the difficulty of distinguishing the species of parasite in many cases, the author has adopted a method which appears to occupy an intermediate position between the thick and thin film. The blood to be examined, 3 or 4 cc., is taken from a vein and rapidly defibrinated in a tube with glass beads. The liquid portion is then transferred to a centrifuge tube and centrifuged. The supernatant fluid is removed and films of medium thickness, " thick thin films," are made from the concentrated cells. The films are very thoroughly dried, preferably in the incubator. They are then stained with a mixture of 3 cc. of distilled water (pH 7·2) and 2 drops of Giemsa. After washing gently in distilled water of the same pH the films are dried and examined. *C. M. Wenyon.*

TRENSZ (F.). Sur un nouveau procédé d'intradermoréaction pour le diagnostic de l'infection paludéenne. [**An Intradermal Reaction for the Diagnosis of Malaria.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 26. pp. 1082–1084.

ROCCHI [this *Bulletin*, Vol. 28, p. 1021] injected haemozoin intradermally and found that it produced a wheal in patients free from malaria but not in those who were infected. The author confirmed this and found that solutions of Seichi's melanine, and of metharfer Bouty acted in the same way as haemozoin. [Haemozoin and melanine are not identical. See SINTON, this *Bulletin*, Vol. 31, p. 706.] *W. F.*

JAMES (S. P.). **The Direct Effect of Atebrin on the Parasites of Benign Tertian and Quartan Malaria.** [Laboratory Meeting Demonstration.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. June 30. Vol. 28. No. 1. p. 3. With 6 figs. on 1 plate.

A plate illustrates the changes in the parasites following a single dose of 0·6 gram of atebrin. The pigment becomes aggregated into lumps

and eventually disappears; the cytoplasm becomes thin and ragged, and breaks up; the nuclear vacuole is distended; the chromatin becomes opened out and diffuse, till finally only a few lightly stained dots remain. *W. F.*

McNabb (P. E.) & Schwartz (S. C.). **Atabrine in the Treatment of Malaria in the Philippine Islands.**—*Amer. Jl. Trop. Med.* 1934. July. Vol. 14. No. 4. pp. 309–317. [11 refs.]

Eleven cases of benign tertian and three of subtertian were treated with atebrin. One of the latter had haemoglobinuria before atebrin treatment was begun. Treatment was successful in every case. A 5-day course appeared to be as effective as a 7-day course; there were no toxic symptoms. "No known relapses have occurred in one case after 4 months and in the remaining cases after 7 to 10 months." *W. F.*

Tareev (E. M.), Bolotina (A.), Gontaeva (A.), Raskin (A.) & Epstein (E.). Sur le traitement du paludisme par l'atébrine. [**On the Treatment of Malaria with Atebrine.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1934. Vol. 3. No. 2. pp. 114–126. [In Russian. French summary p. 126.]

Atebrin (German and Soviet brands) was tested in the hospital of the Tropical Institute, Moscow, on 152 cases of malaria (80 B.T., 54 M.T., 11 Q), and produced a good clinical effect in all of them, including the most grave cases. It had a marked parasiticidal action upon all stages except the gametocytes of M.T. The only after-effect of treatment with atebrin was a slight discolouration of the skin ("pseudo-jaundice"). The drug was administered over a course of 5 days in doses of 0·1 gram 3 times a day. In some cases the cycle was repeated at intervals of 2–3 weeks. In the case of M.T., 0·03 gram plasmocide was given together with atebrin 5 times *per diem.* *C. A. Hoare.*

Chopra (R. N.) & Sen (B.). **Atebrin in Heavy Infection with** *P. falciparum.* —*Indian Med. Gaz.* 1934. July. Vol. 69. No. 7. pp. 392–393.

An Indian patient aged 59 suffering from a severe malignant tertian infection was treated with 0·3 grams of atebrin daily. At the beginning of treatment there were 180,000 rings per cubic centimetre. After 4 tablets there were 28,240 rings per cubic centimetre. After 5 there were only 13,800, and after 7 there were none. [The patient came from a district where malignant tertian prevails and had probably suffered from attacks of malaria for years]. *W. F.*

Manson (D.). **Relapsing Malaria.**—*Indian Med. Gaz.* 1934. June. Vol. 69. No. 6. pp. 314–316.

A case in which atebrin proved unsatisfactory.

A young European woman was given 0·3 gram of atebrin and 0·01 gram of plasmoquine daily for 5 days, from August 27 to September 1, as a prophylactic. Four days after the end of treatment she had a temperature and symptoms of malaria, but no parasites could be found. Similar attacks followed, but repeated examinations disclosed no parasites. Finally, on October 21, she had a temperature of 102°, subtertian parasites were found in her blood and she was given anti-malarial treatment, with an injection of quinine and another course of atebrin with plasmoquine.

About a month later, there was a relapse which was treated with quinine. This was followed by another relapse a month later which was treated with atebrin and plasmoquine, but this time, a parasitic relapse occurred 5 days later. Subsequently, atebrin was given only when parasites appeared in the blood and it was stopped as soon as they disappeared; this method proved more satisfactory, and the patient had little more fever until she left for Europe a few weeks later. There was no question of reinfection in this case [but it is always difficult to be certain that the doses prescribed are the same as the doses taken.] *W. F.*

MASSIAS (C.). Note sur le traitement du paludisme. [**Quinacrine Treatment of Malaria.**]—*Bull. Soc. Path. Exot.* 1934. May 9. Vol. 27. No. 5. pp. 421–424.

Quinacrine appears to destroy all parasites except crescents.

Quinacrine is chloro-2-diethylamino-pentylamino-5-méthoxy-7-acridine. It is canary-yellow in colour, with a bitter taste and a neutral reaction. The dose is 0·3 grams daily in three doses. A course lasts five days and may be repeated after an interval of 5 days. Details are given of 5 cases of benign tertain and 1 case of subtertian treated with this drug. All forms of benign tertian parasites disappeared, and so did subtertian schizonts, but crescents persisted. No toxic symptoms were noted. *W. F.*

RAGIOT (Ch.) & ROBIN (L. A.). Essais de traitement du paludisme par la quinacrine. [**Treatment by Quinacrine.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1934. Mar. Vol. 12. No. 3. pp. 310–329. With 3 folding charts.

—— & ——. Essais sur le traitement du paludisme.—*Bull. Soc. Path. Exot.* 1934. May 9. Vol. 27. No. 5. pp. 426–431.

This drug appears to resemble atebrin in its action.*

The authors treated one case of benign tertian, one case of quartan, and eight cases of subtertian. The patients were given three doses daily for 5 days, and each dose consisted of 0·1 gram. Clinical symptoms disappeared in 4 or 5 days and the schizonts within 5. Crescents were unaffected. There were no toxic symptoms. [See MASSIAS, above.] *W. F.*

RIOU (M.), GOURRY (N.) & HUSSENET (S.). Le paludisme en milieu indigène à Dakar pendant les années 1932–1933. Action comparée de divers médicaments. [**Malaria in Natives at Dakar, 1932–33. Action of Drugs compared.**]—*Bull. Soc. Path. Exot.* 1934. June 13. Vol. 27. No. 6. pp. 579–586.

The results of quinacrine treatment are very good (see MASSIAS, above).

Among 1,199 patients there were 571 cases of subtertian, 548 of benign tertian, and 80 of quartan. Severe cases and large infections occur only in children. The authors have never seen a pernicious case in an adult native. Eighty cases treated with quinine and 70 treated with quinacrine were observed with special care. In 44 benign tertian cases treated with quinacrine, all the parasites had disappeared by the

*According to the Société Parisienne d'Expansion Chimique, the marketers of the Rhône-Poulenc anti-malarial drugs in France and the French Colonies, quinacrine is to be considered as identical in composition with atebrin. [Ed.]

third day. In subtertian and quartan cases the results of quinacrine treatment were as good as those with quinine. There were no true toxic symptoms but two patients complained of slight epigastric pain.

W. F.

SICAULT (G.). Note sur le traitement de dix cas de paludisme par un sel d'acridine. [**Treatment of Ten Cases of Malaria by an Acridine Salt.**]—*Bull. Soc. Path. Exot.* 1934. June 13. Vol. 27. No. 6. pp. 544–546.

The successful intramuscular inoculation of quinacrine.

Three cases of benign tertian, three of subtertian, two of quartan, and two of mixed infection were treated with intramuscular injections of quinacrine dissolved in distilled water, in the proportion 0·1 gram in 5 cc. The doses given were from 0·005 to 0·01 gram per kilo of body weight, and one dose was given daily for 5 days. The patients were children between 3 and 9 years of age. The inoculations were not painful and the resultant swelling disappeared within 24 hours. The results were excellent ; all parasites disappeared except crescents.

W. F.

MASSIAS (C.). Nouvelles observations de 48 paludéens traités par un dérivé quinoléique associé au quiniostovarsol. [**Treatment by a Quinoline Derivative with Quiniostovarsol.**]—*Bull. Soc. Path. Exot.* 1934. July 11. Vol. 27. No. 7. pp. 641–644.

——. Dérivé quinoléinique employé seul contre le paludisme à *Pl. vivax* et à *Pl. praecox.*—*Ibid.* pp. 644–647.

Treatment by 574 F. alone and with stovarsol.

Doses of 0·02 gm. of 574 and 0·25 gm. of quiniostovarsol were given twice a day to 31 cases of benign tertian and 16 cases of subtertian with very good results. *P. falciparum* appeared to be more resistant than *P. vivax*. Quiniostovarsol favours the tolerance of 574, doses twice as large can be given with quiniostovarsol as without it.

Twenty-two cases of benign tertian and 4 cases of subtertian were treated with 574 alone. Several of the patients relapsed early, and there were 2 cases of intolerance with epigastric pains, anorexia, giddiness, etc. [See MASSIAS, this *Bulletin*, Vol. 31, p. 430, also SICAULT and DECOURT, *ibid.*, p. 431.] *W. F*

CHOPRA (R. N.), SEN (B.) & GANGULY (S. K.). **Malarcan in the Treatment of Indian Strains of Malaria.**—*Indian Med. Gaz.* 1934. Aug. Vol. 69. No. 8. pp. 421–424.

" Malarcan is said to be a compound of a stereo-isomeric base of methyl-cupreine combined with methyl-acridinium-chloride and hydrocholic acid. It is probably a derivative of quinine or quinidine." The authors were supplied with this drug through the courtesy of Dr. P. REZAK of Vienna, and they employed it in the treatment of 29 cases of malaria. They found that it acted in the same way as quinine, both in the cure of the attack and in the extent to which it prevented relapses. They concluded that : " the drug is about 4 to 5 times more expensive than quinine and appears to have no advantage over that drug." [See this BULLETIN, Vol. 30, p. 202.] *W. F.*

JOUKOV (N.), KRASSIKOVA (V.) & RYLOVNIKOVA (T.). Sur la méthode de traitement prophylactique des porteurs de gamètes par le plasmocide "A" et "B." [**On a Method of Sterilization of Gamete-Carriers with Plasmocide.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1934. Vol. 3. No. 2. pp. 135–138. [In Russian. French summary p. 138.]

In a previous paper two of the present authors tested the prophylactic action of plasmocide *A* [this *Bulletin*, Vol. 31, pp. 174 & 178]. The present work records the results of tests on the prophylactic action of plasmocide *B* and upon the duration of the sterilizing effect of preparations *A* and *B* upon the gametocytes of the three species of malarial parasites, as manifested by their infectivity for *A. maculipennis* after treatment during one day with 6 doses of 0·015 gram of plasmocide *A* and of 0·03 gram of *B* respectively; the methods used were the same as in the preceding work.

Plasmocide *B* proved to have the same effect upon the gametocytes of B.T. and M.T. as plasmocide *A*, in that it lowered the rate of infection of the mosquitoes. Both preparations administered in doses referred to above prevented infection of the mosquitoes during 48 hours. Hence, in order to have a prophylactic effect, plasmocide should be given to gamete-carriers every third day. *C. A. Hoare.*

FIELD (J. W.). **Notes on "Totaquina."**—*Malayan Med. Jl.* 1934. June. Vol. 9. No. 2. pp. 26–30.

Therapeutically there is little to choose between totaquina and quinine. The only advantage of totaquina is its cheapness.

It will be remembered that totaquina is a form of cinchona febrifuge standardized to contain 70 per cent. of crystallizable alkaloids of which at least 15 per cent. must be quinine. Type I is prepared from the total alkaloids of *Cinchona succirubra*, Type II is prepared from *C. ledgeriana* residues with the addition of sufficient quinine to bring it up to specification. The author treated 417 patients with totaquina Type II, and a control series of 181 patients with quinine. The totaquina was obtained from Messrs. Howards of London. The patients were treated in the District Hospital adjoining the laboratory; thick blood film examinations and parasite counts were made daily during the period of treatment which lasted for 7 days. The drugs were given on a body-weight basis at the rate of 1 or 2 grams per 100 lbs. Tables 3 and 4 contrast the efficiency of totaquina with that of quinine in freeing the peripheral blood from parasites.

Rate of Disappearance of Non-Sexual Parasites from the Peripheral Blood after Commencement of Treatment.		S.T. Malaria 222 cases.
	Totaquina	Quinine
Within 1 day	9 per cent.	12 per cent.
,, 2 days	27 ,,	40 ,,
,, 3 ,,	33 ,,	33 ,,
,, 4 ,,	14 ,,	9 ,,
,, 5 ,,	9 ,,	3 ,,
,, 6 ,,	5 ,,	2 ,,
,, 7 ,,	2 ,,	1 ,,

Rate of Disappearance of Non-Sexual Parasites from the Peripheral Blood after Commencement of Treatment.		B.T. Malaria 78 Cases.
	Totaquina	Quinine
Within 1 day	7 per cent.	9 per cent.
,, 2 days	36 ,,	43 ,,
,, 3 ,,	31 ,,	36 ,,
,, 4 ,,	15 ,,	9 ,,
,, 5 ,,	11 ,,	3 ,,
,, 6 ,,	0 ,,	0 ,,
,, 7 ,,	0 ,,	0 ,,

These tables show that the parasites disappeared rather more quickly with quinine than with totaquina. There was no significant difference in the time of disappearance of fever in the totaquina and quinine treated cases, nor was there any difference in respect of vomiting and toxic symptoms. When administered intravenously to rabbits in a 1 per cent. solution, no difference in the toxic effects of totaquina and quinine was evident. A dose of 2 grams per 100 lbs. body-weight was sometimes too much and a dose of 1 gram was sometimes too little. The author recommends something between the two ; say 20 grains a day for the average Asiatic. It is most conveniently administered in capsules, or in powder form, washed down with water. It is not completely soluble in an acid mixture. It possesses no advantage over quinine except its lower price ; at present totaquina Type II costs 1s. 4¾d. an ounce as compared with quinine sulphate at 1s. 11d. An increased demand may send up the price of the residues from which it is manufactured. Large scale production of Type I would necessitate extensive planting of *C. succirubra.* Planters will not undertake this in the face of the growing popularity of the new synthetic remedies. The cinchona industry is threatened by these new drugs : the separation and purification of quinine is an expensive process ; the total alkaloids can be extracted relatively simply and cheaply, and if the continued economic production of quinine on a large scale is seriously threatened, its replacement by a cheap cinchona product seems to be a possible development. *W. F.*

SCHWETZ (J.) & BAUMANN (H.). Sur l'efficacité thérapeutique resp. prophylactique du cinchona fébrifuge, comparativement à celle de la quinine. [**Cinchona Febrifuge and Quinine Compared.**]—*Riv. di Malariologia.* Sez. I. 1934. Vol. 13. No. 3. pp. 353–364.

The authors used a febrifuge supplied by the Société Produits Roche. It contained 60 per cent. of active alkaloids as compared with 73 per cent. in the quinine sulphate which is usually employed. But while its alkaloidal content was only 20 per cent. less than that of quinine, its price was half ; quinine costs 1s. 8d. and cinchona febrifuge costs 10d. an ounce. The author found that when the febrifuge was given in the same doses as quinine, the results were almost the same, but when the dose of febrifuge was twice as large, the results were better. *W. F.*

COLLINS (Ralph K.). **A Field Experiment in Quinine Treatment.**—*Amer. Jl. Trop. Med.* 1934. July. Vol. 14. No. 4. pp. 329–338.

The treatment of malaria with short courses of quinine lasting 4 days is recommended.

This paper concerns observations made at the Petrich (Bulgaria) Station for Field Studies in Malaria. The prolonged method of treatment advised for general use by the National Inspectorate of Malaria in Bulgaria, consists of 1 gram of quinine daily for 8 days, repeated after an interval of 5 days, and then succeeded by a period of prophylactic treatment which lasts altogether for 77 days and consumes 32 grams of quinine. The short method of treatment used by the author consisted of 1 gram of quinine sulphate daily for 3 or 4 days on the occasion of each acute attack, and he states that "the striking feature of our experience is the fact that the majority of the patients suffered but a single acute attack during the malaria season. . . . The number of 'well' days without treatment experienced by persons receiving minimal doses for their acute attacks is considerably greater than in the case of patients receiving a prolonged course of treatment. At the same time the danger of recrudescence is only slightly greater." There is also a saving of about £7 on every 100 cases treated by the shorter method. *W. F.*

SMITH (E. C. Temple). **Quinine Amblyopia.**—*Med. Jl. Australia.* 1934. Sept. 1. 21st Year. Vol. 2. No. 9. p. 289. With 1 chart.

Amblyopia after 15 grains of quinine; but the evidence is untrustworthy.

The author was called to see a young unmarried woman who had become suddenly blind. She first denied having taken any drug, and then said that she had taken 15 grains of quinine. (She had missed one monthly period.) The pupils were widely dilated and immobile. Three weeks later, the visual fields were much restricted, the discs were pale and the arteries contracted. No further history was obtainable. *W. F.*

NAUCK (E. G.). Chemotherapeutische Versuche bei Affenmalaria (*Pl. knowlesi*). [**Chemotherapy in Monkey Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Aug. Vol. 38. No. 8. pp. 313–326. With 12 figs. [12 refs.]

Experiments carried out on monkeys infected with *P. knowlesi* to test the therapeutic value of certain antimalaria drugs.

The drugs employed were quinine, atebrin and plasmoquine. The effective dose is higher in the case of all three drugs than the dose for man. With sufficiently high doses of atebrin monkeys can be cured with certainty; not only do they remain free from relapses, but they can be infected with the homologous strain of malaria parasite shortly after cessation of the infection. Quinine and plasmoquine act more slowly on the dividing forms than atebrin. The special gametocidal property of plasmoquine could not be determined. Better results were obtained with quinine and plasmoquine in combination than with either alone. Atebrin cannot prevent relapses with certainty. Treatment with atebrin towards the end of the incubation period prevents the occurrence of infection. Atebrin tolerance (Festigkeit) was not observed.

E. D. W. Greig.

BOVET (D.), BENOIT (G.) & ALTMAN (R.). Action thérapeutique de quinoléines à poids moléculaire élevé, homologues de la plasmoquine, sur les hématozoaires des calfats et des serins. [**Therapeutic Action of Quinolines of High Molecular Weight on Haematozoa of Calfats and Canaries.**]—*Bull. Soc. Path. Exot.* 1934. Mar. 14. Vol. 27. No. 3. pp. 236–242. With 1 fig. [11 refs.]

The characteristic feature of the new anti-malarial drugs is the presence of a dialkylaminoalkylamino- side chain: $HN(CH_2)_nNRR'$. In plasmoquine and atebrin the chain is branched and $n=5$, $\cdot HN\cdot CH(CH_3)\cdot CH_2\cdot CH_2\cdot CH_2\cdot N(C_2H_5)_2$, and is attached to a methoxyquinoline and a chloromethoxyacridine nucleus respectively. The authors have examined the action of a series of homologues of plasmoquine with unbranched chains where $n=2$ to 11. The graph obtained by plotting minimal effective doses of the various compounds against values of n is roughly parabolic with summits at $n=3$ and $n=5$. This is for calfats (Java sparrows) parasitized with Haemoproteus and may be taken as a measure of activity against the sexual form of the parasite. When the same set of compounds is tested in avian malaria in canaries the activities for the higher values of n are almost as great as for the lower values of n in the calfat. Thus the chemotherapeutic index when $n=11$ is 1/100 for the canary and 1/3 for the calfat, and it is assumed that the higher activity in the canary must be due to action on both the sexual and asexual forms of the parasite. If this assumption is valid, it should be possible to synthesize drugs active against both forms, and it follows that increase of the molecular complexity, as in the replacement of quinoline by acridine in passing from plasmoquine to atebrin, or by lengthening the side chain in plasmoquine, causes a change from activity against sexual to activity against asexual forms.

T. A. Henry.

LOURIE (E. M.). **Studies on Chemotherapy in Bird Malaria. 1.—Acquired Immunity in Relation to Quinine Treatment in** *Plasmodium cathemerium* **Infections.**—*Ann. Trop. Med. & Parasit.* 1934. July 12. Vol. 28. No. 2. pp. 151–169. With 1 fig.

Early treatment with large doses of quinine does not interfere with the development of immunity. An interesting and important paper.

The ordinary course of infection in a canary, after intramuscular or intraperitoneal inoculation with *Plasmodium cathemerium*, is as follows: An incubation, or prepatent period, of 2 to 4 days is followed by the appearance of parasites in the blood which increase rapidly for about 4 days; then a crisis occurs which involves a striking disappearance of parasites from the circulation. A few may be found for a week or two longer, and then the bird passes into the latent stage during which, while no parasites can be found, inoculation of its blood into another bird will produce an infection. During this latent stage, the bird is immune to superinfection. The first object of the author's work was to determine whether this immunity was as effective in birds which had been treated with quinine from the earliest stage of infection, as it was in birds which had not been treated at all. With this in view, a series of birds was treated with injections of quinine which were begun a few days after the inoculation of the *P. cathemerium* infection and were continued for a fortnight. About 6 weeks later, these birds and

a control series which had not been treated with quinine were reinoculated with *P. cathemerium*. The result showed that the early treatment had not interfered with the production of immunity. When the acute phase was suppressed by quinine there developed as powerful an immunity to superinfection as is acquired when an infection is not subjected to any treatment.

It was also found that when very large numbers of parasites were inoculated into canaries during the latent stage, they disappeared at least as quickly in the birds which had been previously treated with quinine as in those which had received none. If the early prophylactic quinine treatment was continued for more than 10 days, the number of parasites appearing in the blood after its termination was always less than the number in untreated birds. This indicates that " the immunity enjoyed by birds which have been subjected to such treatment is largely built up during the actual course of its administration . . . . most of the birds treated for longer periods than 3 weeks were frankly carried right over into the latent stage of infection." These points are of importance not only theoretically, but also as regards certain problems of human malaria. " These findings do not correspond with the theory that in human malaria the early exhibition of quinine must interfere significantly with the acquirement of immunity or tolerance," but " the finding of a set of circumstances in one form of malaria does not necessarily establish a general rule for all malarias." Daily injections of quinine, up to a quarter of the minimum lethal dose, did not result in sterilization of *P. cathemerium* infections. *W. F.*

ROSKIN (Gr.) & ROMANOWA (K.). Arzneistoffe und Ultraviolettstrahlen. XIII. Mitteilung. Kombinierte Therapie bei Vogelmalaria. [**Combined Therapy with Drugs and Ultraviolet Rays in Bird Malaria.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1934. July 23. Vol. 82. No. 5/6. pp. 461–474.

Experimental research to determine the effect of ultra-violet rays in augmenting the action of salvarsan preparations in the treatment of bird malaria.

The authors conclude that novarsolan exerts a certain therapeutic effect in light infections of bird malaria. If non-therapeutic doses of novarsolan are given simultaneously with ultra-violet rays no effect is noted. From this it may be accepted that in canaries the " factor A " is either not produced or in very small quantities [see this *Bulletin*, Vol. 28, p. 912]. In mice on the contrary it is produced. The serum of irradiated mice increases the therapeutic properties of novarsolan and neosalvarsan in bird malaria. This indicates that " factor A" can activate neosalvarsan preparations in the organism of animals which belong to a different species to those in which it was produced. " Factor A " produced by radiation of mice possesses the character of an " activator." [*loc. cit.*, Vol. 29, p. 353.] *E. D. W. Greig.*

SHAH (K. S.). **The Periodic Development of Sexual Forms of *Plasmodium cathemerium* in the Peripheral Circulation of Canaries.**—*Amer. Jl. Hyg.* 1934. Mar. Vol. 19. No. 2. pp. 392–403. With 6 figs. & 2 graphs. [14 refs.]

In canaries experimentally infected with *Plasmodium cathemerium* the time of appearance of gametocytes, the number of these present and

their attainment of maturity is strictly parallel to the appearance, development and number of the asexual forms. Whenever asexual forms are present gametocytes are present also, while the reproduction of the schizonts at about 6 p.m. is associated with the arrival at maturity of gametocytes which at that stage of their development have completely displaced the nucleus of the host cell. The growth of the gametocyte from the merozoite takes place in the peripheral blood.

C. M. Wenyon.

HUFF (Clay G.) & GAMBRELL (Elizabeth). **Strains of** *Plasmodium cathemerium* **with and without Gametocytes.**—*Amer. Jl. Hyg.* 1934. Mar. Vol. 19. No. 2. pp. 404–415. With 4 figs. [19 refs.]

Two strains of *Plasmodium cathemerium* after a number of bi-weekly passages from canary to canary became completely gametocyteless. Another strain after similar treatment still retained a few gametocytes while other strains continued to produce them in large numbers. Birds after recovery from an infection of a gametocyteless strain, which had lost its regular periodicity, had become slightly more virulent and was showing an altered staining reaction, were immune to infection with a normal strain, the normal parasites injected, both asexual and sexual forms, being quickly removed from the blood. These parasites, though removed from the blood, remained in the bird's system as a latent infection for at least eight months along with the atypical strain.

C. M. W.

BOYD (Geo. H.) & ALLEN (Lane H.). **Adult Size in Relation to Reproduction of the Avian Malaria Parasite,** *Plasmodium cathemerium.*—*Amer. Jl. Hyg.* 1934. July. Vol. 20. No. 1. pp. 73–83. With 4 figs. [11 refs.]

A study of *Plasmodium cathemerium* in canaries has shown that the average size of the parasites is usually greatest at the commencement of an infection and decreases as the parasites become more numerous, only to increase again as the attack subsides. The variation may be as much as 39 per cent. of the maximum size. In spite of this the reproduction periods occur regularly at about 6 p.m. each day, the number of merozoites produced being directly dependent on the size of the schizont. It thus appears that the initiation of schizogony is not determined by the size of the parasite. The rate of growth of the parasite could be retarded by the administration each day of four doses of one-fourth of a mgm. of quinine hydrochloride. *C. M. W.*

MANWELL (Reginald D.). **The Duration of Malarial Infection in Birds.**—*Amer. Jl. Hyg.* 1934. Mar. Vol. 19. No. 2. pp. 532–538. [20 refs.]

By observations on 118 birds which had recovered from infections with one or other of five species of malarial parasite it was shown that parasites persisted in the body throughout the period of observation which was not less than a year in any case and three years in a few instances. The results show that great caution must be exercised before concluding that an infection in a bird has been completely removed even when inoculation of blood into a clean bird fails to produce infection. *C. M. W.*

FINDLAY (G. M.) & BROWN (H. C.). **The Relation of the Electric Charge of the Red Cells to Phagocytosis in Avian Malaria.**—*Brit. Jl. Experim. Path.* 1934. June. Vol. 15. No. 3. pp. 148–153. With 2 figs. [11 refs.]

One of the authors (H.C.B.) has already shown that the serum from a canary with a latent malarial infection is capable of reducing the electric charge not only of canary red blood corpuscles but also of mouse corpuscles and even bacteria, and that this property is related to an increase of the euglobulin fraction of the serum leading to the formation of a layer of euglobulin on the surface of the antigen. In the present paper evidence is produced which suggests that the serum of canaries with latent malaria is capable of sensitizing infected red cells in rendering them more susceptible to phagocytosis, as evidenced by an increase in the incubation period after inoculation of the sensitized cells into clean birds. It is further noted that blood from a canary recovering from a malarial attack produces infection less readily than blood taken at the beginning of the attack, even when the number of infected cells injected is approximately the same. The electric charge of the cells during an attack is correlated with the size of the spleen and the degree of phagocytosis of infected cells by the macrophages in this organ. *C. M. W.*

SERGENT (Etienne). Météorologie et rechutes de paludisme (phases lunaires, pression barométrique). [**Meteorology and Malarial Relapses.**]—*Arch. Inst. Pasteur d'Algérie.* 1934. June. Vol. 12. No. 2. pp. 201–204. With 2 graphs.

This paper deals with relapses during the latent stage in canaries infected with *Plasmodium relictum*; 212 relapses have been observed in 116 canaries at the Pasteur Institute of Algiers during 22 years. It was found that these relapses occurred most frequently during the period between the first quarter of the moon and the full moon. HUCHON has noted that the same occurs in human malaria. The author also found that the greatest number of relapses occurred when the maximum barometric pressure was low. *W. F.*

SERGENT (Edm.), SERGENT (Et.) & CATANEI (A.). Un type de maladie à prémunition: le paludisme des passereaux à *Plasmodium relictum*. [**Passerine Malaria** (*P. relictum*), **a Type of Premunition Disease.**]—*Ann. Inst. Pasteur.* 1934. Aug. Vol. 53. No. 2. pp. 101–119. With 5 figs. [Refs. in footnotes.]

In this article the authors discuss the whole question of immunity in bird malaria, which they regard as a definite premunition. A canary inoculated with one species of bird malarial parasite has an acute attack from which it may recover. If it does so the infection becomes a chronic one in which a balance is struck between the host and the parasite. The parasites in the bird are so few in number that their presence can only be detected by the inoculation of large quantities of blood into susceptible birds. The chronic infection in the canary has been found to persist for from 1 to 5 years during which period the bird cannot be reinfected with the same strain of parasite. Directly the bird loses its infection completely there is no longer any immunity, the bird being as susceptible to inoculation as it was originally. The

authors have never observed a case of a canary naturally resistant to a first infection, while they have found that the serum taken from a bird during its premunition stage cannot confer immunity on another bird. It is not possible to produce an immunity by the inoculation of killed parasites, for birds are never immune unless parasites are present in the body. The only type of vaccination obtainable is one in which the initial acute attack is avoided, the bird after inoculation passing directly into the condition of premunition. This occurs naturally in the case of some birds, but can be brought about by the use of certain drugs which are capable of preventing the acute attack or by the inoculation of altered parasites, such as old sporozoites from the salivary glands of mosquitoes or those parasites which occur in the blood of a bird soon after inoculation and before parasites are actually detectable by microscopic examination in its blood, in other words, by the inoculation of blood taken from another bird during the period of incubation.

C. M. Wenyon.

ROUBAUD (Emile) & MEZGER (Jean). Sur la sensibilité au paludisme des oiseaux (*Plasmodium relictum*) des divers peuplements raciaux du moustique commun, *Culex pipiens* L. [**Susceptibility to Bird Malaria of Various Races of** *C. pipiens*.]—*C. R. Acad. Sci.* 1934. July 9. Vol. 199. No. 2. pp. 170–172.

HUFF has shown that if a number of *Culex pipiens* taken at random are fed on birds with malaria the infection of the mosquitoes is not uniform, some even failing to become infected. He has also shown that the descendants of such resistant individuals are also resistant, so that by selection it is possible to establish resistant strains of this mosquito. [See this *Bulletin*, Vol. 27, p. 892.] The authors of the paper under review have tested the susceptibility to bird malaria infection of three natural races of *Culex pipiens*. Two of these, *C. pipiens pipiens* and *C. pipiens berbericus* are open air, rural or garden races which normally have access to birds, the former in France and the latter in N. Africa, while the third is an autogenous race of *C. pipiens* which has adapted itself to urban surroundings where it feeds on man rather than on birds. The result has been that whereas the last named race always becomes infected so that 100 per cent. of the exposed mosquitoes show over 10 oöcysts, the two rural races become infected very irregularly, the first giving 32 per cent. and the second 48 per cent. of individuals which either resist infection entirely or show less than 6 oöcysts. This result seems to suggest that, like human beings, mosquitoes which have been constantly exposed to bird malaria infection acquire a certain immunity which is entirely absent in the race which rarely, if ever, feeds on birds.

C. M. W.

RAFFAELE (Giulio). Sul comportamento degli sporozoiti nel sangue dell'ospite. [**The Behaviour of Sporozoites in the Blood of the Host.**]—*Riv. di Malariologia.* 1934. Vol. 13. No. 4. pp. 395–403. English summary (9 lines).

The author carried out many experiments—nine groups *in vitro* and three *in vivo*—using the sporozoites of the avian parasite *P. praecox*, obtained from the salivary glands of Culex and also mature oöcysts, with a view of ascertaining the penetration of sporozoites into the red corpuscles. He placed them in contact with blood itself (of a goldfinch), with serum first, then blood, with normal saline and blood, at

different temperatures and for varying lengths of time. In the *in vivo* experiments he injected the glandular contents into the thigh muscles, or subcutaneously, or directly into the blood stream. The results in each case were negative and the author concludes that "sporozoites inoculated by mosquitoes do not provoke the infection through immediate penetration in the circulating erythrocytes; on the contrary, they seem to be rapidly destroyed." *H. H. S.*

GIOVANNOLA (Arnaldo). Tentativo di classificazione dei plasmodi aviari. [**Classification of the Avian Plasmodia.**]—*Riv. di Malariologia.* Sez. I. 1934. Vol. 13. No. 3. pp. 372–379. With 24 figs. on 1 plate. English summary.

The number of known species of malarial parasites of birds has increased considerably in recent years. Apart from the originally described *Plasmodium praecox* (or *P. relictum*, as some maintain it should be), a comparatively large parasite with spherical schizonts and gametocytes producing considerable deformity of the host cell, other species have been discovered which are either much smaller in size than *P. praecox* and produce a correspondingly smaller number of merozoites, or possess elongate gametocytes which, surrounding the nucleus, often render differentiation from halteridium a matter of difficulty.

The author of the paper under review tabulates the known species under three headings—1, forms which have spherical gametocytes and cause displacement of the nucleus of the host cell; 2, forms which have elongate gametocytes and displace the nucleus; 3, forms with elongate gametocytes and no nuclear displacement. To the first group belong *P. praecox*, *P. cathemerium*, *P. capistrani* and *P. wasielewski*; to the second *P. elongatum*; to the third *P. rouxi*, *P. tenue*, *P. circumflexum* and *P. fallax*. The paper gives the differential diagnosis of these species and a plate illustrating the various types. *C. M. W.*

SINTON (J. A.) & MULLIGAN (H. W.). **Mixed Infections in the Malaria of the Lower Monkeys. Part I. Mixed Infections as the Cause of Apparent Variations in the Morphology and Pathogenicity of Simian Plasmodia. Part II. The Probable Occurrence of Mixed Infections in Some of the Older Records of Monkey Malaria.**—*Records of the Malaria Survey of India.* 1933. Dec. Vol. 3. No. 4. pp. 719–767. [38 refs.]; pp. 769–808. [73 refs.]

In a paper published in 1932 (this *Bulletin* Vol. 29, p. 701) KNOWLES and DAS GUPTA reported the discovery in what they took to be an African monkey, *Cercopithecus pygerythrus*, of a scanty plasmodium infection which they successfully inoculated to other monkeys and also to man. It was noted that in *Silenus rhesus* the infection was severe and fatal while in *C. pygerythrus* it was mild. Furthermore the morphology of the parasite was different in the two hosts and it was concluded that this variation was due to differences in the influence on the parasite of the two hosts. It was later pointed out by KNOWLES (Editorial, *Indian Med. Gaz.*, Vol. 67, p. 701) that the original monkey and the others with which he and DAS GUPTA had worked under the name of *Cercopithecus pygerythrus* was actually *Silenus irus* (*Macacus cynomolgus*), an oriental species. The new principle which was introduced into parasitology by the assumption that the host was able to influence so profoundly the morphology of a parasite seemed to the

authors of the paper under review so important that they felt it advisable to investigate the matter further with a view to finding out if some other explanation might not account for it.

In Part I of this paper they describe in detail a long series of careful experiments and observations all of which lead to one conclusion, namely that the original monkey found infected by KNOWLES and DAS GUPTA and others of the same species investigated later were actually harbouring two distinct parasites, one of which was *Plasmodium inui* var. *cynomolgi* Mayer, 1907 and the other *P. knowlesi* Sinton and Mulligan, 1932. Pure strains of these two forms were obtained by methods which are described. It is noted that each retained its morphological characters, whether infecting *S. rhesus*, *S. irus* or *S. sinicus* and that there was no indication whatever that a series of passages in one species or a transfer to another one was able to bring about any change in morphology. It is shown that *P. knowlesi* is particularly virulent for *S. rhesus*, so that when a monkey of this species is inoculated with a mixed infection, either the naturally occurring one or one intentionally produced, it is *P. knowlesi* which is most evident. On the other hand in mixed infections in *S. irus*, which are mild in nature, it is *P. inui* var. *cynomolgi* which is most prominent. Passaged to a monkey of a different genus, *Pygathrix schistaceus*, *P. knowlesi* again retained its characteristic morphology. Amongst other differences between the two parasites it is noted that the schizogony cycle of *P. knowlesi* is 24 hours while that of *P. inui* var. *cynomolgi* is 48 hours. Attempts to transmit *P. knowlesi* by mosquitoes failed, though on several occasions development up to the occurrence of sporozoites in the salivary glands of *Anopheles annularis* (*A. fuliginosus*) was obtained. With *P. inui* var. *cynomolgi*, on the other hand, healthy *S. rhesus* were infected on three occasions by the bites of *A. annularis* and once by *A. subpictus*, while oöcysts and salivary gland infection with sporozoites were found in a high percentage of these mosquitoes as well as *A. maculatus*, *A. culicifacies* and *A. splendidus* fed on infected animals. It was noted that in attempts to produce infection by injection of sporozoites from ruptured oöcysts or from freshly infected salivary glands failure always resulted. It is suggested that some period of maturation of sporozoites in the salivary glands may be necessary before they become infective. In work of the kind discussed in this paper it is evidently of the utmost importance that the monkeys used for inoculation purposes be free from latent infection. The methods of detecting such latent infections with a view to the exclusion from experiments of already infected animals are described, as also those employed for isolating pure strains of one or other species of malarial parasite from mixed infections such as occur very commonly in *S. irus*. The monkey *S. rhesus*, so largely employed for the experiments, has never been found by the authors to have a natural malarial infection though they have submitted it to the most careful tests.

In the second part of the paper the authors discuss the general question of mixed infections of malarial parasites in monkeys. A number of observers have recorded changes in morphology of parasites, the staining reactions of the host cells and the pathogenicity in passages from one species of monkey to another. The work conducted with *P. knowlesi* and *P. inui* var. *cynomolgi* has shown that all these so-called changes may be caused by unrecognized mixed infections, so that many of the older descriptions and accounts of malarial parasites of monkeys are correspondingly inaccurate. From this point of view the authors

examine the literature of the subject and come to the general conclusion that unrecognized mixed infections are responsible for many confusing statements and discrepancies. It is evident that the specific morphology of these parasites will require reinvestigation in the light of the experiences gained by the studies described in this paper. With a view to assisting in the re-examination there is given a list of the genera of African and Asiatic monkeys in which malarial parasites have been found and in which some indication of the degree of prevalence has been noted.

The above account of this valuable paper does little more than give an outline of its contents. It is full of the most useful detail which will be invaluable to all who contemplate investigations on monkey malaria. The authors have found themselves in a very favourable position for such an investigation, with an abundance of material in the shape of naturally uninfected animals like *S. rhesus*, so that it may be said that for the first time there has been conducted a thorough investigation of a single malarial parasite of monkeys. The thoroughness of this work and the results obtained rather suggest that many of the previous accounts of malarial parasites of monkeys have little other value than the mere record of a malarial infection in a particular monkey.

C. M. W.

MALAMOS (B.). Das Blutbild bei Affenmalaria. [**Blood Picture in Monkey Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Sept. Vol. 38. No. 9. pp. 374–386. With 8 figs. [11 refs.]

Observations on the blood changes in monkeys following the inoculation of *Plasmodium knowlesi*.

In the investigations the monkeys chiefly employed were *Mac. cynomolgus* (syn. *S. irus*), also one *Mac. rhesus* (syn. *M. mulatta*) and one *Cercopithecus mona*. The strain of *Plasmodium knowlesi* used was obtained from London.

Blood counts of normal monkeys give :—*Cercopithecus* 19,600 leucocytes, 5,950,000 erythrocytes and 58 per cent. haemoglobin, *Mac. rhesus* 16,000 leucocytes, 5,200,000 erythrocytes, and 60 per cent. haemoglobin. The author was struck by the low haemoglobin value compared with high count of the red cells ; the colour index is low, 0·6.

As a result of his experimental study the author concludes that *Plasmodium knowlesi* infection in the monkeys employed causes a severe toxic anaemia by destruction of the red cells and blocking of the blood forming organs. The peak of the anaemia occurs towards the end of the infection and it may reach a high degree, the red cells and haemoglobin dropping to 1,000,000 and 21 per cent. respectively. The character of the anaemia is micro-macrocytic with aniso- and poikilo-cytosis, polychromatophilia and Cabot's rings. Spontaneous regeneration occurs very rapidly with many normoblasts and macroblasts. Shortly after the infection a leucocytosis occurs, the white cells rising to 26,400, soon followed by a leucopenia, the leucocytes falling to between 12,000 and 15,000, in one case 4,000, the latter chiefly due to a diminution of polynuclears ; a shift to the left does not occur. During regeneration myelocytic cells are numerous owing to stimulation of the bone marrow. Resistance to the infection is accompanied by a high grade monocytosis ; many of these cells are laden with parasites and pigment. During the infection the number of lymphocytes is not diminished, but rather slightly increased. In fatal

infections in splenectomized animals the number of monocytes and lymphocytes is much diminished compared with infected non-splenectomized monkeys. *E. D. W. Greig.*

MALAMOS (B.). Die Rolle des Retikulo-Endothelialen Systems, insbesondere der Milz bei Affenmalaria. [**Rôle of the Reticulo-Endothelial System, particularly the Spleen in Monkey Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Aug. Vol. 38. No. 8. pp. 326–342. With 7 figs. [20 refs.]

An experimental study of the part played by the reticulo-endothelial system and particularly the spleen in monkeys infected with *Plasmodium knowlesi*.

Normally infection with *Plasmodium knowlesi* in *Macacus cynomolgus* runs a chronic course and requires no treatment, but if the spleen is removed or the R.E.S. is blockaded with trypanblue or Indian ink the animals die in from 4–9 days after appearance of parasites if not treated. It does not matter at what stage splenectomy is performed, whether a long time before or in the chronic phase of infection ; whereas a blockade can only raise the virulence when administered before infection and has no effect whatever in the chronic stage. The treatment of splenectomized and blockaded monkeys with atebrin, quinine, and quinine and plasmoquine gave exactly the same results as in non-splenectomized monkeys, so the spleen is not necessary for this form of therapy. *E. D. W. Greig.*

MALAMOS (B.). Ueber eigentümliche Parasitenkapseln bei menschlicher Malaria (*Pl. vivax* und *Pl. ovale*) und Affenmalaria (*Pl. knowlesi*). Vorläufige Mitteilung. [**Peculiar Parasite Capsule in Human and Monkey Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Aug. Vol. 38. No. 8. pp. 342–349. With 14 figs. on 1 plate. [18 refs.]

A peculiar capsule formation is described in connexion with the *Plasmodium vivax* and *ovale* in man, and the *P. knowlesi* in monkeys.

A definite capsule which stains like chromatin with Giemsa is seen round the parasites. It cannot be definitely stated whether the capsule forms part of the parasite or the red cell containing it. It is only seen in schizonts, and chiefly in the early dividing forms. A curious morphological alteration occurred in splenectomized superinfected monkeys: the capsule was seen to break up into loops or to become entirely dissolved. During the division of the parasites a body was observed inconstantly, which was not pigment, but clumps of blue staining protoplasm that often contained pigment.

E. D. W. Greig.

SCHWETZ (J.). Recherches sur la malaria congénitale et l'infection malarienne du placenta dans la malaria endémique de l'Afrique Centrale. Deuxième étude. [**Congenital Malaria and Malarial Infection of the Placenta in Central Africa.**]—*Riv. di Malariologia.* 1934. Vol. 13. No. 4. pp. 435–442. With 17 coloured figs. on 1 plate.

Adult schizonts were found in the placenta ; young rings and crescents were found in the peripheral blood. No congenital malaria was found [but see SCHWETZ & PEEL, below].

No malaria was found in 33 newly born native infants although parasites were present in 21 of the mothers. Parasites were far more numerous in the placenta than in the peripheral blood of the mothers. The young rings and crescents which are commonly found in the peripheral blood are rare in the placenta. Here adult schizonts of *P. falciparum*, pigmented or in division, are the commonest forms. *P. malariae* was found in the peripheral blood of three mothers, and *P. vivax* in the blood of one, but these species were not found in the placenta. Possibly, the tropism of *P. falciparum* for the internal organs is the reason for the persistence of this species in the adult native. [See this *Bulletin*, Vol. 23, p. 130 (BLACKLOCK & GORDON).]

W. F.

SCHWETZ (J.) & PEEL. **Congenital Malaria and Placental Infections amongst the Negroes of Central Africa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Aug. 4. Vol. 28. No. 2. pp. 167–174.

The placenta behaves as a true internal organ and contains adult dividing forms of *P. falciparum*. Out of 56 cases, the infant was congenitally infected in two (see also SCHWETZ above).

The authors examined 56 native women at the time of childbirth with the following results :—

(*a*) Peripheral blood of mother.	Percentage infected	...	68·0
(*b*) Placental blood	,,	,,	,,	...	74·0
(*c*) Cord blood	,,	,,	,,	...	6·0
(*d*) Infant's blood	,,	,,	,,	...	3·6

The parasites seen in the blood taken from the mothers, the infants, and the cords were young schizonts. In the placentas numerous fully grown forms were seen (pigmented and in division), and some were undergoing phagocytosis. The placenta behaved as a true internal organ, like the spleen, in containing the adult schizonts of *P. falciparum*. In 16 per cent. of cases, a heavy placental infection was found although there were no parasites in the peripheral blood. In no case did the placental infection appear to have a detrimental influence on the child. "Though congenital malarial infection is possible even in children born of mothers who are healthy though infected, in practice it is of little importance since the high parasite index of native children, and even of infants, is the result of infections acquired after birth." *W. F.*

DAVIS (Nelson C.). **The Microscopical Examination of 29,593 Human Livers from Central and Northern Brazil, with Special Reference to the Occurrence of Malaria and Schistosomiasis.**—*Amer. Jl. Hyg.* 1934. May. Vol. 19. No. 3. pp. 567–600. With 6 charts & 3 maps. [14 refs.]

This paper deals with the diagnosis of malaria, schistosomiasis and yellow fever by means of the examination of liver sections.

A large number of specimens of liver have been collected by means of an instrument specially designed for the rapid removal of liver tissue by laymen without autopsy [see this *Bulletin*, Vol. 31, p. 836]. By this means yellow fever was detected in 43 places where it was not known to be present. The present paper concerns the distribution of malaria and schistosomiasis as indicated by this method, and their diagnosis from yellow fever by means of the examination of the liver

tissue. Unequivocal histopathological diagnosis of intestinal schistosomiasis rests on finding eggs surrounded by an inflammatory reaction which produces characteristic nodules. In early stages, if eggs cannot be found, the appearances resemble those of other diseases which produce miliary granulomata. Pigmentation may resemble that of malaria, but the pigment is chiefly confined to the portal zone and is concentrated in the nodules. The pigment is usually fine and dust-like, whereas, in malaria, much of it is in the form of round, shot-like bodies. "Malaria, either alone or complicated by blackwater fever, is capable of producing lesions which may be confused with those of yellow fever." This is particularly the case in fulminant malaria and blackwater fever. In malaria the necrosis is typically central, while in yellow fever it is midzonal; but variations occur. *W. F.*

SINTON (J. A.) & GHOSH (B. N.). **Studies of Malarial Pigment (Haemozoin). Part III. Further Researches into the Action of Solvents, and the Results of Observations on the Action of Oxidising and Reducing Agents, on Optical Properties, and on Crystallisation.**—*Records of the Malaria Survey of India.* 1934. June. Vol. 4. No. 2. pp. 205–221. With 2 charts. [17 refs.]

Haemozoin and haematin are apparently identical. The authors conclude that :—

(*a*) The rates of solution of haemozoin and haematin are the same.

(*b*) Reducing agents produce the same effect on both the pigments.

(*c*) Spectroscopic measurements suggest strongly that the two substances are identical.

(*d*) Crystals of haematin chloride and haematin iodide can be formed from haemozoin, and the crystals are indistinguishable from those obtained from haematin.

(*e*) Pyridine-haemochromogen crystals can be obtained both from haematin and from haemozoin.

"As a result of these and our previous experiments we consider that the pigment found in *P. knowlesi*, a malarial parasite of lower monkeys, is indistinguishable from haematin." *W. F.*

JAMES (S. P.). **The Shute Method of making Preparations of Ex-Flagellating Gametocytes and Oökinetes of Malarial Parasites.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. June 30. Vol. 28. No. 1. pp. 104–105.

The method is thus described :—

"*For ex-flagellation of male gametocytes.*—Prepare four Petri dishes by fitting two layers of filter paper accurately cut to size in the top half of each dish, and the same in the bottom half. Moisten the filter paper with as much water as it will absorb, but not more. Lay a triangular piece of glass tubing in each dish and place the four dishes in a moist atmosphere incubator at 25°C. for two hours. The dishes should not be piled on one another. When the blood is to be examined, take the dishes (each wrapped in cloth so that it does not become cold) and prepared slides to the bed of the patient with an assistant who will hold a separate dish ready for each blood film as it is made. Prick the finger, make a thin film (but not too thin), breathe lightly on it and quickly lay it on the glass tubing in the dish from which the assistant has momentarily removed the lid for the purpose. He quickly replaces the lid and, when four similar preparations, each in its own dish, are ready, he takes them without delay to the incubator where the first will remain 15 minutes, the second 20 minutes, the third

25 minutes and the fourth 30 minutes. At each of those intervals a film is taken out, inspected to ascertain that it is still moist and allowed to dry in the air. Then it is stained in the usual way with Leishman or Giemsa stain. The count is made per 100 leucocytes, only the forms which show complete ex-flagellation being included. A count of total leucocytes per c.mm. in the peripheral blood is made at the time of taking the films in order that the number of ex-flagellating parasites may be expressed per c.mm. of blood as well as per 100 leucocytes.

"*For oökinetes in blood from the mosquito's stomach.*—Allow some female *A. maculipennis* without ripe ovaries to feed on a patient whose blood contains a good number of gametocytes and place them in a moist atmosphere incubator, the temperature being 25°C. and the humidity not less than 80 per cent. At intervals between 10 and 20 hours later remove one or two mosquitoes from the incubator and proceed as follows :—Chloroform the mosquito and remove its legs and wings. Flood the centre of a perfectly grease-free slide with Locke's fluid in which to dissect the insect. For dissection fix the left-hand needle on the thorax and with the right-hand needle nick the chitin on both sides of the fourth abdominal segment and gently pull on the last segment so as to draw out the mid-gut containing the blood clot without tearing the wall of the stomach. Using a dissecting microscope, cut away the malpighian tubules, lift the clot on the point of a dissecting needle and transfer it to a drop of Locke's fluid previously placed on another clean slide. Cut and tear the clot so that the blood as it leaves the stomach becomes quickly mixed with the Locke's fluid, but keep the teased area as small as possible to prevent any part of the blood from drying. When the blood and fluid are thoroughly mixed to form a large drop, make thin films from it on clean slides in the same way as if it were a drop of finger blood. With practice eight or more films can be made from the drop. Let the films dry in the air and stain with Leishman or Giemsa stain. Search for oökinetes with the oil-immersion lens." *W. F.*

GIOVANNOLA (Arnaldo). La colorazione vitale degli sporozoiti ed il suo impiego nella diagnosi dell'infettività degli anofeli. [**Vital Staining of Sporozoites in Anopheles.**]—*Riv. di Malariologia.* Sez. I. 1934. Vol. 13. No. 3. pp. 327–331. With 1 fig. English summary.

The author dissects anopheles in a 0·5 per cent. solution of brilliant cresyl blue in physiological salt solution [not 50 per cent. as in the English summary]. The sporozoites, which appear coloured and motile, are easily distinguished among the unstained fat droplets which come out of the thorax.

W. F.

TUDORANU (G.), HERESCU (D.) & GRINBERG (A.). Sur la lipase sérique chez les paludéens quininisés ou non quininisés. [**Serum Lipase in Treated and Untreated Malaria.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 26. pp. 1117–1118.

The serum lipase is not reduced in untreated malaria. When quinine is added to serum *in vitro* this fat-splitting lipase is destroyed, and when patients are treated with quinine or plasmoquine it is reduced. The quinine resistant corpuscle lipase does not pass into the plasma. *W. F.*

WINCKEL (Ch. W. F.). Kunstmatig opgewekte malaria quartana. [**Artificially Induced Quartan Malaria.**]—*Nederl. Tijdschr. v. Geneesk.* 1934. Sept. 29. Vol. 78. No. 39. pp. 4455–4475. With 3 figs. [12 refs.] English summary.

The inoculation of quartan malaria should be reserved for those patients who are immune to tertian. It is an excellent treatment when the paroxysms remain quartan, but the majority of the author's

patients had fever daily, or on three days out of four. The fever cannot be so readily controlled by drugs as the fever of tertian malaria ; it is resistant to neosalvarsan. The incubation after mosquito bites, or after the subcutaneous inoculation of infected blood, averages 26 days. After intravenous injection it is only 10 days. Quinine acts perhaps a little more quickly than atebrin, but after atebrin there are fewer relapses. *W. F.*

LACOUR (P. R.). Recherches sur la malaria-floculation de Henry. (Sa sensibilité. Sa spécificité. Sa valeur pratique.) [**Henry's Malaria Flocculation.**]—67 pp. [80 refs.] 1934. G. Doin & Cie, 8 Place de l'Odéon, Paris (VI). [15 frs.]

The main conclusion is that the reaction is useful in diagnosis.

This little book begins with a description of the technique of Henry's reaction, the preparation of the iron and the melanin solutions, the arrangement of the tubes, and the reading of the results. This is followed by a review of the results obtained by HENRY himself, and by other workers. HENRY examined 100 healthy persons, all were negative ; 450 persons with active malaria, all were positive except during the febrile attacks ; 750 old malaria cases, many were positive ; 400 syphilitics, all were negative. The findings of the other workers quoted were confirmatory. The author next gives the results obtained by himself in the examination of 381 sera. Twenty-eight cases of active malaria were all positive ; 68 healthy persons were all negative. Two patients with sleeping sickness and 9 guineapigs infected with trypanosomes were all negative. Three patients suffering from haemolytic jaundice gave positive results ; this appeared to be the only condition, except malaria, in which a positive reaction was obtained. The interval between the date of infection with malaria and the time at which the reaction became positive was studied in six cases of therapeutic malaria. The reaction in these patients was negative during the incubation, but became positive after five or six paroxysms had occurred. The author summarizes the views of HENRY, and of other workers, as to the nature and specificity of the reaction. His own view is that while this question remains unsolved, there is no doubt about the usefulness of the reaction in diagnosis. *W. F.*

GREIG (E. D. W.), VAN ROOYEN (C. E.) & HENDRY (E. B.). **Serological Diagnosis of Latent Malaria.**—*Lancet.* 1934. June 30. pp. 1393–1394.

——, —— & ——. **A Note on the Melano-Precipitation Serological Reaction in Malaria.**—*Jl. Trop. Med. & Hyg.* 1934. July 2. Vol. 37. No. 13. pp. 193–195.

——, —— & ——. **Observations on the Melano-Precipitation Serological Reaction in Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Aug. 4. Vol. 28. No. 2. pp. 175–191. With 4 figs. [33 refs.]

The authors employ a pigment derived from hair, in place of Henry's antigen prepared from choroid membrane.

They have investigated Henry's melanoflocculation reaction in cases of induced therapeutic malaria. HENRY uses, as his antigen, a suspension of ox choroid membrane. A drawback to this melanin solution is that non-specific reactions may occur from the interaction of human

sera with the ox protein derived from the choroid. The authors therefore sought for a source of melanin pigment free from foreign protein and capable of reacting with malarial sera in a quantitative manner. This they claim to have found in pigment obtained from human hair.

"The melanin pigment solution is derived from human hair by hydrolysis with 50 per cent. HCl, followed by concentration in vacuo and purification by dialysis in a collodion membrane. This has been found to give a pure and stable suspension of pigment. A set of 9 dilutions of patient's serum is prepared ranging from 1 : 2 to 1 : 512 in distilled water. To each is added an equal volume (0·4 c.cm.) of pigment solution, and the series is incubated at 37°C. for 5½ hours before the reading is taken. Positive results are observed as white granular precipitates forming at the foot of the tube. . . The reaction appears about the 5th to 7th day of infection, although no parasites may be seen at this stage and the patient is afebrile. The maximum titre of 1 : 128 is reached about the 4th week, and then rapidly declines following the administration of drugs. Control tests on 129 different non-malarial sera gave only 2 non-specific positive results. It is probable that the phenomenon is not due to the interaction of antigen and antibody, for it can be shown that positively reacting sera may be inactivated by heating to 55°C. for half an hour and that the repeated immunisation of rabbits with melanin pigment fails to produce an agglutinin response."

The occurrence of a reaction with positive sera and dioxyphenylalanine, the precursor of melanin, shows that the reaction is due to the melanin and not to any other substance. [According to SINTON and GHOSH, malaria pigment, or haemozoin, is a different substance from the body pigment, melanin. See this *Bulletin*, Vol. 31, p. 706]. The lipoid phosphorus content of the serum tends to vary inversely with the reacting titre of the serum. The term melano-precipitation is suggested in place of Henry's melano-flocculation. *W. F.*

WISEMAN (R. Howitt). **The Nature of Henry's Reaction in Malaria.**—*Lancet.* 1934. Sept. 8. pp. 543–544.

This reaction can be obtained by adding distilled water to the serum; a solution of melanin is unnecessary. (See GREIG above, also CHORINE.)

The author employed the melano-precipitation method of Greig, van Rooyen and Henry, using their melanin solution prepared from hair (see above), and he made a parallel series of tests in which he used distilled water instead of melanin. He found that exactly similar precipitates occurred in both the distilled water series and the melanin series, the only difference being that the precipitate was coloured brown in the melanin tubes. Every case which was positive in the melanin tubes was positive in the controls with distilled water. HENRY calls the flocculation with distilled water "surfloculance." The author concludes "I have formed the opinion that these phenomena are one and the same, the melanin merely adding a brown colour to the flocculation. . . . The precipitate is in all probability a globulin." (See TRENSZ, this *Bulletin*, Vol. 30, p. 483.) *W. F.*

CHORINE (V.), PRUDHOMME (R.) & KOECHLIN (D.). Floculation du sérum dans l'eau distillée et réaction de Henry. [**Henry's Reaction and the Flocculation of Serum in Distilled Water.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 27. pp. 1255–1257.

The results obtained by adding sera to distilled water are almost exactly the same as those obtained with Henry's antigens (see WISEMAN above, also GREIG).

Normal sera give little or no flocculation in distilled water, syphilitic sera give a little flocculation, malarial sera give a great deal. The test is made by adding 0·2 cc. of the serum to 1·8 cc. of distilled water, and a reading is taken at once in the photometer. The tubes are then put in the incubator for 3 hours and, after 20 minutes at room temperature, a second reading is taken. The titre is obtained by subtracting the first reading from the second. A number of sera collected from normal persons, from syphilitics, and from people suffering from malaria were examined by this distilled water method, and simultaneously by Henry's melanoflocculation test. It was found that sera giving readings of less than 10 in distilled water gave negative Henry's reactions; sera giving readings between 10 and 25 gave doubtful Henry's reactions; sera giving readings above 25 gave positive Henry's reactions. Among 66 malarial sera, 60 gave readings between 35 and 60, 4 between 15 and 30, and 2 between 11 and 12. Among 130 syphilitic sera the readings were below 10 in 105. In 158 normal sera, the readings were below 10, and Henry's reaction was negative in 151. Among the remainder there were 7 (? 6) with readings between 10 and 15, three of these gave doubtfully positive Henry's reactions, and one with a reading of 21 gave a positive Henry's reaction. In kala azar, high titres of 100, 150 and more are reached.

The authors conclude that the flocculation of serum in distilled water and the reaction of Henry are due to the same principle, and that there exists an almost complete concordance between the two methods.

W. F.

GREIG (E. D. W.), HENDRY (E. B.) & VAN ROOYEN (C. E.). **The Chemistry of Malarial Serum, with Reference to the Factors concerned in the Melano-Precipitation Test.**—*Jl. Trop. Med. & Hyg.* 1934. Oct. 1. Vol. 37. No. 19. pp. 289–295. [12 refs.]

Melanin acts as an indicator in Henry's reaction, not as a true antigen. "Surfloculance" and flocculation with melanin are due to the same changes in the serum. (See CHORINE above, also WISEMAN.)

The authors have found that in sera giving a positive Henry's reaction there is no increase in albumen, total globulin, cholesterol or chlorides. The precipitate consists of one of the globulin fractions, probably euglobulin which occurs in excess in malaria. A positive reaction also occurs in kala azar, where there is also an excess of euglobulin. It is suggested that protolipoid complexes may enter into the reaction, since it cannot be merely a question of euglobulin increase, because this substance is in excess in syphilis, in which Henry's reaction is negative.

The authors have investigated the phenomenon of "surfloculance" or the apparent flocculation which occurs in tubes containing serum and distilled water without antigen. They conclude that this is probably the same as the flocculation which occurs with melanin solutions in Henry's reaction. The precipitation occurs in higher dilutions in the distilled water tubes than in the tubes containing melanin, and probably "the addition of the melanin solution has no effect other than that of suppressing the precipitation which would appear with a normal serum, and allowing only the deposition of the excessive amount of precipitate which comes down in a malarial serum. . . . There is a second use of the pigment, namely, to colour the precipitate and thus

make the reaction more easily observed, but this is relatively unimportant." The pH of the melanin solution is very important and a second factor of importance is found in the small quantity of sodium chloride which is present in it. "Both the slight alkalinity and the presence of this electrolyte will cause the suppression of any precipitate which would occur with normal serum on addition of water only," but the melanin solution does not contain enough alkali or chloride to suppress the larger reaction which occurs in malaria. Many other colouring matters can be used instead of melanin, *e.g.*, methyl violet, or methylene blue, but melanin gives the sharpest reaction. Melanin acts only as an indicator, and the active principles in the so-called "antigen" are the concentration of sodium chloride and the pH. (This *Bulletin*, Vol. 30, p. 483.) *W. F.*

CHWATT (L.). Influence de l'infection tuberculeuse expérimentale sur la réaction de Henry. [**Henry's Reaction in Experimental Tuberculosis.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 23. pp. 707–709.

The serum of tubercular guineapigs gives a positive Henry's reaction.

Two lots of guineapigs, one of 6 and the other of 4, were inoculated with a virulent strain of tubercle. Henry's reaction, which was negative at first, became positive in all of them during the third week, and remained positive until death, which took place 7 to 8 weeks later. With smaller doses, or with less virulent strains, the reaction may remain negative for months. The serum of 6 rabbits infected with syphilis gave a negative reaction. *W. F.*

HENRY (X.). La sérofloculation palustre. [**Serofloccculation in Malaria.**]—*Arch. Inst. Prophylactique.* 1934. July–Sept. Vol. 6. No. 3. pp. 324–337. English summary.

The author describes the technique of his reaction, and the methods of preparing the reagents. He discusses the significance of the optic density as determined by Vernes's photometer. He states that if the serum is heated for half an hour at 55°C. specific flocculation no longer occurs, but that the flocculation of the serum with distilled water (surfloculance) is only slightly affected. [Some workers consider that surfloculance and melanoflocculation are essentially the same. (See CHORINE, WISEMAN, GRIEG above.)] *W. F.*

HENRY (A. F. X.). Les fausses floculations en sérologie palustre. [**False Flocculation in Malarial Serology.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 27. pp. 1237–1239.

Anomalous positive reactions occasionally occur in other diseases than malaria. For instance, in typhus, trypanosomiasis, kala azar and tuberculosis of guineapigs. This is probably the result of a serological instability. True malarial flocculation is abolished when a serum is heated to 55°C. for half an hour. If flocculation occurs in a serum after it has been heated, one knows that it is not specific.

W. F.

DE MEILLON (Botha). **Entomological Studies. Studies on Insects of Medical Importance in South Africa.**—*Publications of South African Inst. Med. Res.* 1934. June. No. 33. pp. 249–308. With 16 plates.

The paper contains descriptions of new species of Xenopsylla and Simulium ; of a new variety of *Anopheles natalensis*, differing from the typical form in the hypopygium and marking of the legs of the adult male and in the structure of the pupa ; and of certain previously unknown early stages of South African Anopheles. The descriptions are fully illustrated.

Perhaps the most interesting part of the paper is the description of the eggs of ten species of Anopheles. The author finds distinctions between the eggs of *A. funestus* and of var. *leesoni*, and uses this knowledge to identify females caught in nature, dissecting them and examining the nearly mature eggs. He also finds that the egg of *A. cinereus* is peculiar in having no floats but hanging vertically in the water. In these points it resembles the egg of *turkhudi* ; this is interesting, for the two species were known to resemble each other in the details of larval and pupal structure. *P. A. Buxton.*

WASSILIEFF (A.). Quelques remarques sur les moustiques de Tunisie. [**Observations on the Mosquitoes of Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1934. Aug. Vol. 23. No. 3. pp. 368–383. With 1 folding map. [14 refs.]

Little, and that of a fragmentary character, has hitherto been published on the subject of this paper, which is of local rather than general interest. Notes are given on the larvae and breeding places, as met with by the author in the region to the south of the city of Tunis, of *Anopheles algeriensis*, *A. multicolor* and *A. hispaniola*. In the malarious district known as the Sahel de Sousse, numbers of paucidentate *A. maculipennis* females, usually gorged with blood, were found in a state of semi-hibernation in the larders of Arab houses. Such mosquitoes are especially dangerous, since they are capable of biting as many as thirty times ; their destruction during the winter anti-mosquito campaign should therefore by no means be overlooked. *E. E. Austen.*

GASCHEN. Prospection entomologique au Laos. [**Entomological Survey of Laos.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1934. May. Vol. 12. No. 5. pp. 533–540. With 1 fig.

As suggested by geology and climatology, the anopheline fauna of Central Laos, with which this paper is concerned, is the same as that of Tongking (excluding the delta). The component species are :—*Anopheles aconitus*, *A. aitkeni*, *A. barbirostris*, *A. fuliginosus*, *A. jeyporiensis*, *A. maculatus*, *A. maculipalpis*, *A. minimus*, *A. philippinensis*, *A. sinensis* and *A. vagus*. Among these, during the period 1931–1933, in the combined territories of Tongking, Annam and Laos, TOUMANOFF found much the highest percentage of infection (3·91) in *A. minimus*. This species occurs wherever the country is hilly or mountainous, and well watered. That *A. maculatus*, a possible vector, is ubiquitous in the Mekong valley is due to the periodic inundations caused by the river, and to the fact that this mosquito breeds in places freely exposed to the sun. Thus to prevent *A. maculatus* from breeding, shade rather than clearing is required.

A. culicifacies, not yet found in either the Lower or Central region, has been met with in Upper Laos. No specimen examined was infected, although in India an infection rate as high as 16 per cent. has been observed; special attention should be paid to this insect in Northern Indo-China.

Whenever it is desired to open up country for industrial development, a malarial survey, both clinical and entomological, should first be undertaken. Appropriate prophylaxis will then, in the words of ROUBAUD, rupture the relations between man and mosquito.

E. E. A.

ROZEBOOM (L. E.). **The Effect of Bacteria on the Hatching of Mosquito Eggs.**—*Amer. Jl. Hyg.* 1934. Sept. Vol. 20. No. 2. pp. 496–501.

The author considers that results obtained by him, when working with eggs of the yellow fever mosquito (*Aëdes aegypti*), may serve to reconcile discrepant findings of certain previous authors as to the influence of bacteria on hatching, since much depends on the age and condition of the eggs. When old and dry, eggs of *A. aegypti* rarely hatch in sterile water but, in the same medium, fresh, moist eggs do so much more readily. In the case of both dry and moist eggs the addition of bacteria has a stimulative effect on hatching. As previously stated by ROUBAUD (see this *Bulletin*, Vol. 27, p. 497), eggs deposited by older females tend to be "inactive." With regard to other species, the condition of the medium, whether sterile or contaminated, made no difference to the hatching of eggs of *Culex pipiens*, *C. territans* and *C. salinarius*. *E. E. A.*

AMBIALET (R.). Sur l'entrainement des larves de moustiques dans les cours d'eau. [**The Transportation of Larvae by Running Water.**]—*Arch. Inst. Pasteur d'Algérie.* 1934. June. Vol. 12. No. 2. pp. 205–208.

The author points out that it is possible for a collection of water to be free from larvae on one day and on the next to contain numbers of them in an advanced stage of development. He gives several examples. In a palm plantation at Biskra, the trees were watered once a fortnight. There was a hole in the ground at the foot of each tree. These holes communicated with one another, and when one was full of water it ran into the next, and so on. Most of the holes dried up in the interval between the waterings, but some retained a little water and in this mosquito larvae flourished. When the trees were next watered, these larvae were carried by the current and distributed among the other water-holes Another example is given in which anopheline larvae were carried from a ravine into a water-hole in a vegetable garden.

W. F.

LEWIS (D. J.). **The Eggs of Four Species of *Anopheles* from West Africa.**—*West African Med. Jl.* 1934. Apr. Vol. 7. No. 4. pp. 135–136. With 1 fig.

The four species, the eggs of which were procured at Gadau, Northern Nigeria, are *A. gambiae*, *A. funestus*, *A. pharoensis* and *A. rufipes*, and Equatorial African specimens of all of these but the last were lately

described by GIBBINS [this *Bulletin*, Vol. 31, p. 56]. Eggs, readily obtained by the present author by isolating female mosquitoes in a suitably damp atmosphere, " were preserved on filter paper in sealed glass tubes wetted on the inside with a solution of five per cent. formalin and one per cent. glycerine." A short description is given of the egg of each of the above-mentioned species, accompanied by a table of measurements derived from the means of batches. Owing to the variability of anopheline eggs, it is, for diagnostic purposes, " necessary to examine eggs from large numbers of females." *E. E. A.*

TREILLARD (M.). Humidité et longévité dans la biologie et le pouvoir pathogène, en Indochine méridionale, de *Myzomyia minima* et *Pseudomyzomyia vaga*. [**Humidity and Longevity in the Biology and Pathogenic Power of** *Anopheles minimus* **and** *A. vagus* **in S. Indo-China.**]—*Bull. Soc. Path. Exot.* 1934. July 11. Vol. 27. No. 7. pp. 668–670.

A. minimus is the chief malaria carrier in Indo-China, but *A. vagus*, one of the species in which the plasmodium is least often found, is said to be definitely zoophile. Apart, however, from the different degrees of androphily displayed by these two species, the harmlessness of *A. vagus* to man is explicable by the shortness of its life as compared with that of *A. minimus*. It is obvious that the longer a domestic Anopheles survives the greater will be its chance of conveying malaria by biting a second time. In artificial conditions the mean duration of life is about five times longer in *A. minimus* than in *A. vagus*, and in both cases individual longevity is most marked at the time of greatest abundance—the dry season for *A. minimus*, the rains for *A. vagus*. At the seasons indicated, the former breeds in clear streamlets, the latter in collections of waters heavily charged with organic matter. Thus differing longevity would seem to be associated with a fundamental difference in larval nutrition, since shortness of life characterizes individuals reared on material rich in protein, and markedly longer life those brought up in a medium poorly supplied with vegetable food.

The difference in the seasonal occurrence of the two species would appear also to be due to the different hygrometric requirements of their respective adults, a high degree of prolonged humidity being unfavourable in the one case, while the lack of it is even more so in the other.

E. E. A.

MANSON (D.). **Some Notes on the Identification of Some Anopheline Larvae by Macroscopic Methods.**—*Records of the Malaria Survey of India.* 1934. June. Vol. 4. No. 2. pp. 197–203.

The author has found that practice has enabled him to identify anopheline larvae in the field with a considerable degree of accuracy by putting them in a white porcelain dish and examining them with the naked eye. A table is given which sets out the distinguishing points of 18 species of anopheline larvae. *W. F.*

BOYD (Mark F.) & MULRENNAN (J. A.). **The Establishment of a Cage Colony of** *Anopheles punctipennis*.—Reprinted from *Ann. Entom. Soc. America.* 1934. June. Vol. 27. No. 2. pp. 311–312.

Stimulated by their success in maintaining a colony of the North American *A. quadrimaculatus* for more than two years, the authors, in

Florida and using the same technique, turned their attention to *A. punctipennis*. Having, down to the end of March, 1934, raised three generations of the latter, they are satisfied that they have established a colony capable of reproducing itself indefinitely. It is noted that, in the insectary, a negro is attacked by *A. punctipennis* more avidly than is a white man ; and that, while *A. quadrimaculatus* is prone to bite the legs, the upper parts of the body are preferred by *A. punctipennis*. *E. E. A.*

COMPAGNINI (G.). Cambiamento dei caratteri somatici della fauna anofelica nella bonifica di S. Eufemia. [**Change of Somatic Characters of Anophelines after Bonification.**]—*Riv. di Malariologia.* Sez. I. 1934. Vol. 13. No. 3. pp. 264–271. With 1 map. English summary (10 lines).

In the bonificated region of South Eufemia, zoophilous multidentate anopheles (average number of dentations more than 14) were most common in those places where animals had been kept in stables and where the ground had been developed by agriculture for some time prior to the installation of great drainage schemes ; but in the regions where hydraulic works of sanitation had been carried out without previous cultivation of the land, there was a striking prevalence of the androphilous paucidentate variety. *W. F.*

NIJKAMP (J. A.) & SWELLENGREBEL (N. H.). Waarnemingen hoe *Anopheles maculipennis* den nieuwen Wieringermeerpolder binnendrong. [**How** *Anopheles maculipennis* **invaded the New Wieringermeer Polder.**]—*Nederl. Tijdschr. v. Geneesk.* 1934. July 28. Vol. 78. No. 30. pp. 3427–3443. With 3 figs. & 1 graph. English summary.

SWELLENGREBEL (N. H.) & NYKAMP (J. A.). **Observations on the Invasion of the Wieringermeerpolder by** *Anopheles maculipennis*.—*Quarterly Bull. Health Organisation, League of Nations.* Geneva. 1934. Sept. Vol. 3. No. 3. pp. 441–460. With 4 maps & 1 chart.

The observations described were made in Holland from 1931 to 1933. In the Wieringermeer, as in other sea polders (low-lying reclaimed land), the high salinity of the water prevents *A. maculipennis* from breeding, but this obstacle will gradually disappear. Meantime the local anopheline density is only one-fourth or one-fifth of that in areas where breeding is unhindered, and the greater part of the adult Wieringermeer Anopheles is composed of immigrants. As a set-off, since rabbits and poultry form the only livestock, there is little " stabular deviation," and the mosquitoes are very numerous in houses. Although mosquitoes in bedrooms, and therefore potential malaria-carriers, were regularly destroyed, the numbers of Anopheles found in each house were scarcely affected. More energetic measures, however, especially the use of pyrethrum sprays, consequent on the appearance of malaria in the new polder, caused wholesale destruction of the domestic, immigrant Anopheles. Yet unless stabular deviation be established concurrently with breeding conditions, when the latter become normal, malaria is likely to be more prevalent in the Wieringermeer than in districts outside. *E. E. Austen.*

DE BUCK (A.) & SWELLENGREBEL (N. H.). **Behaviour of Dutch *Anopheles atroparvus* and *messeae* in Winter under Artificial Conditions.**—*Riv. di Malariologia.* Sez. I. 1934. Vol. 13. No. 4. pp. 404–416.

The authors' summary is as follows :—

"Atroparvus in winter requires occasional bloodmeals to keep alive, messeae does not. The natural winter habits of atroparvus and messeae can be changed completely by artificial conditions (high temperature and humidity, over-feeding). These conditions remove the physiological difference between the two races during natural hibernation : gonotrophic dissociation in atroparvus, gonotrophic concordancy in messeae. But this physiological difference remains, none the less, a very real one as the natural behaviour of an animal is, obviously, of more importance than its reactions to artificial conditions it is not likely to meet in nature."

W. F.

DE BUCK (A.), SCHOUTE (E.) & SWELLENGREBEL (N. H.). **Cross-breeding Experiments with Dutch and Foreign Races of *Anopheles maculipennis*.**—*Riv di Malariologia.* Sez. I. 1934. Vol. 13. No. 3. pp. 237-263. With 6 figs. on 1 plate.

While the details of the lengthy series of experiments described in this paper are of much interest from the Mendelian standpoint, the practical outcome may well be that, at least in the majority of cases, what are now regarded as varieties, races or sub-species of *A. maculipennis* will henceforth rank as distinct species. According to the authors the "most important conclusion", to be drawn from their studies, "is the proof that the Dutch races of *Anopheles maculipennis*, which in the course of the last 9 years have been recognised as units, can claim to be considered as species from a genetic point of view, because they maintain their independent status in nature by their interracial sterility. *Atroparvus*, moreover, has to be assigned a position quite apart from all known races of *Anopheles maculipennis* on the strength of its stenogamy (mating in confinement)."

E. E. Austen.

WEYER (Fritz). Ueber die Anophelen Mecklenburgs, insbesondere die Verbreitung der Rassen von *Anopheles maculipennis*. [**The *Anopheles* of Mecklenburg, especially the Distribution of the Races of *A. maculipennis*.**]—Reprinted from *Sitzungsberichte u. Abhandlungen d. Naturforschenden Gesellsch. z. Rostock.* 1933. 3rd Ser. Vol. 4. pp. 59–75. With 3 figs.

The Anopheline fauna of Mecklenburg consists of *A. maculipennis* (generally distributed, and including the races *atroparvus*, *messeae* and *typicus*), *A. bifurcatus*, *A. plumbeus* and *A. algeriensis*, the latter met with in one locality and previously only twice found in Germany.

Details of the local occurrence of the races of *A. maculipennis* are given, and its causes are discussed. The dominant coastal form is *atroparvus*, a more adaptable race than *messeae*, the peculiarities of which it sometimes exhibits ; both *typicus* and *messeae* occasionally oviposit on brackish water. From year to year and at different seasons of the same year, chiefly as a result of climatic and temperature changes, the proportions of the three races in local mosquito populations show marked variation. Although in Germany, as in Holland, where

malaria occurs *atroparvus* predominates, this in itself is not a sufficient justification for describing the latter as a " dangerous " race. On the contrary, it need not always be associated with malaria ; and on the coast of Mecklenburg, as in the marshes of the Elbe and certain other localities where *atroparvus* abounds, the absence of malaria cannot simply be ascribed to the presence of a particular race, or to a peculiar property of the latter. *E. E. A.*

HACKETT (L. W.). **The Present Status of our Knowledge of the Sub-Species of** *Anopheles maculipennis.—Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Aug. 4. Vol. 28. No. 2. pp. 109–128. With 3 plates. [35 refs.]

To the reader well-nigh swept off his feet by the present spate of papers dealing with the racial question in *A. maculipennis*, this clearly written résumé will furnish a welcome holdfast.

Wing-measure and maxillary index, as well as certain larval hairs and a spine on the male hypopygium show divergences from the mean, and we have to fall back upon egg-characters. In Europe, the bulk of *A. maculipennis* is readily divisible according to the design on the dorsal surface of the egg into five groups, or six if *A. elutus* be regarded as a sub-species. The diagnostic characters of these six groups, races, varieties or sub-species are conveniently shown in a table. That the features exhibited by the eggs are really of value, for the distinction of groups or sub-species, is indicated by the fact that larvae and adults bred from a given type of egg exhibit a combination of distinctive characters—morphological, statistical and biological.

The local occurrence of a given sub-species, within its range, would seem to depend primarily upon the nature of the water in potential breeding places. On the other hand the various types of egg are apparently connected " not only with an adaptation to certain kinds of breeding place, but also with other physiological characters of the sub-species, as exhibited in sexual behaviour and winter habits."

Although no race of *A. maculipennis* actually shuns man, wherever there is livestock more hungry mosquitoes are attracted to the animal than to human habitations. Thus, instead of " deviation by animals," we should more properly speak of occasional deviation by man. The reasons, whether chemical or physical, for the higher attraction of animal quarters are obscure.

The limited endemicity of malaria in Holland and N. Germany (E. Friesland), although the distribution of the proved carrier (sub-sp. *atroparvus*) is much wider, probably results from the effect of certain factors upon the attraction of domestic animals. " The ability of any local anopheline population to maintain malaria depends on the degree to which it uses human beings as host." *E. E. A.*

FEDERATED MALAY STATES. **Annual Report of the Malaria Advisory Board for the Year 1933** [MARTIN (P. H.), Acting Chairman].—16 pp. 1934. Kuala Lumpur : Govt. Press.

The Board approved unanimously a resolution to the effect that, after considering the question of drug prophylaxis, they desired to emphasize their opinion that no available method could be regarded as a satisfactory substitute for anti-larval control. A low grade oil made from the residue of finer grades, and known as Sludge Oil, was found to be

unsuitable for antimalaria purposes. Reports were received that water contaminated with oil caused the death of fowls, but experiments made by the Board showed " that antimalarial oiling was of no great danger to poultry."

A sub-committee reported to the Board on the subsoil drainage of Terentang Estate, a government-subsidized experiment which had been going on for many years. They concluded that " this experiment could not be taken as satisfactory evidence either for or against the use of subsoil drainage on estates." They found that the designing and laying of subsoil drains required more expert knowledge than is available among the staff of an estate ; but that the knowledge necessary for keeping such drains in repair could be acquired readily. The cost of upkeep on estates is greater than on cleared sanitary board areas. " Provided such specialized supervision were available, there is no reason to suppose that anti-malarial subsoil drainage would not be as successful on estates as elsewhere." As regards the question of costs, compared with other equally adequate anti-malarial measures, it was felt that, as so much depended upon local factors, no definite pronouncement could be made.

Professor K. B. WILLIAMSON had reported to Board on the efficacy of sluicing as a method of larval control in Cameron Highlands, and they had conducted experiments in lowland ravines selected by him, and provided with sluice-gates made to his design. The friable soil of the lowlands rendered the method unsuitable. Heavy rain repeatedly washed away the gates and, apart from this, the flush of water when the gates were opened damaged the banks. In addition, it was found that " destruction of larvae which remain stranded within the reservoirs and drains cannot be assured." *W. F.*

ARNELL (O. R.). **The Control of Malaria.**—*East African Med. Jl.* 1934. Sept. Vol. 11. No. 6. pp. 200–202.

In his report on the prevention of malaria in Mauritius (1908) Sir Ronald Ross first attempted to formulate the quantitive laws describing the rise and fall of malaria in terms of variations of the natural factors (frequency of anophelines, proportion of cases of malaria at a given moment, etc.). On Sir Ronald's suggestion, Mr. H. WAITE published a mathematical study of the problem in 1909–10 (*Biometrika*, Vol. VII, p. 421) and finally Sir Ronald himself dealt with the subject at length in an addendum to the second edition of *The Prevention of Malaria.* Mr. Arnell's article discusses the subject very briefly, and offers, without proof, a formula expressing the malaria rate in terms of nine variables. It would be impossible without close study to say how far the result is an improvement upon that reached by Ross. *M. Greenwood.*

VICKERS (W. J.), WEST (G. F.) & D'NETTO (S. G.). **Economy in Large Scale Antimalarial Control in Kuala Lumpur, Federated Malay States.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. June 30. Vol. 28. No. 1. pp. 85–99. With 1 fig. [18 refs.]

——. **Some Recent Local Advances in the Economics of Practical Malarial Control.**—*Malayan Med. Jl.* 1934. June. Vol. 9. No. 2. pp. 40–43. [32 refs.]

The new brush-oil-spray method adds to efficiency and greatly reduces the costs. Paris green is not as good as oil. Fish are useless. Brushwood is washed away in wet weather.

The official boundaries of Kuala Lumpur, the capital of the Federated Malay States, enclose an area of 16 square miles with a population of 120,000. The official anti-malaria zone extends for half a mile beyond these boundaries and comprises an area twice as large. Permanent anti-malaria work is carried out by the P.W.D. and consists of efforts to remove all water as quickly as possible by means of concrete surface drains and subsoil pipes. About one-third of the area is controlled in this way, the rest is still under earth ditching and oiling, the so-called temporary larval control. Oil was applied every 7 days up to 1933 and the results were very satisfactory; the numbers of fresh cases arising in the town were 37 in 1929, 83 in 1930, 45 in 1931, 36 in 1932; with a spleen rate of 1 to 4 per cent. in the children. It became necessary in 1933 to make large reductions in expenditure; several ways of reducing costs were tested experimentally, such as extending the intervals between successive oilings and so on, but the most satisfactory results were obtained by a modification of Quaife's method of brush oiling (see this *Bulletin*, Vol. 31, p. 711). A thin line of oil is sprayed on the surface of the stream or drain with an oil-sprayer, and then a coolie distributes it vigorously with a brush for a 100 yards or more down the stream. All large ponds are similarly treated at the edges and all small ponds and pot-holes are treated with a mop dipped in oil. It is unnecessary to oil the main channels, because enough reaches them from the side streams. The authors emphasize "that in such a scheme as the above, where a minimum of oil is used, grave danger will be encountered unless *constant, skilled* and *intimate supervision* is possible. In Kuala Lumpur this is obtained only through a thoroughly trained oiling and maintenance gang. . . . Better and more systematic upkeep of drains is required with this method than with the old." The average cost per annum of oiling a drain 3 feet wide by the old spray method was $1·31, the cost with the new brush-spray method was only $0·88. The results, as regards the prevention of malaria, by the new method have been excellent. The number of fresh infections in 12 months has been reduced to 24, and the spleen rate has fallen to 0·73 per cent. The oil used is the M.D.B. mixture of the Asiatic Petroleum Co., consisting of solar oil 45 gallons, Diesel oil 15 gallons and kerosene 4 gallons.

As regards some other methods of control, such as fish, the authors state that in their experience the natural enemies of larvae "are rarely of practical value." Paris green is as costly as oiling and, in Kuala Lumpur, the results are less satisfactory. Brushwood (see this *Bulletin*, Vol. 31, p. 712) is of value in preventing anopheline breeding, but it is washed away in heavy rain, and overflow and seepage result unless the drains are taken to a depth at least three times that normally required. *W. F.*

STRICKLAND (C.) & GIBSON (D.). **"Backdoor Drainage," an Anti-malarial Measure designed to meet a Particular Physiographical Situation in Sylhet District, Assam.**—*Indian Med. Gaz.* 1934. Aug. Vol. 69. No. 8. pp. 432–437. With 2 maps & 9 figs.

Swamps, or *bhils*, are frequently formed when the mouth of a tributary stream becomes silted up. "Back-door drainage" apparently means the cutting of a channel which drains the *bhil* in a direction different from that of its original outflow.

"The common practice of the straightening out of rivers by cutting by-passes is folly, because as explained above, rivers are curved in their courses in obedience to dynamic laws ; . . . on no account should open drainage through recent alluvium be resorted to, but such areas of deterioration may perhaps be drained out by the 'back-door method,' thus defeating nature by a stratagem. This back-door drainage is very often impracticable, as a cutting to an active stream at a suitable level would be too costly." *W. F.*

MURPHY (R. A.). **Anti-Malarial Work on a Group of Tea Estates in South Sylhet.**—*Indian Med. Gaz.* 1934. Aug. Vol. 69. No. 8. pp. 437–439. With 1 chart.

In 1926, practically no anti-malarial work had been attempted in the tea districts in India, and consequently the scheme which was based mainly on the findings of Dr. STRICKLAND in his survey of tea districts in 1922–23 was really an experiment in sanitation. The estates lie on low hills bordering the flood plains and their drainage is obstructed by alluvial deposits. The first step was to deal with the extensive anopheles-breeding marshes or *bhils*. This was accomplished by silting or by "back-door" drainage (see STRICKLAND above). The next step was to deal with the drains ; this was done by growing shade trees and shrubs along their banks. Cattle do much damage to the growing vegetation and it is necessary to prevent this by fencing. On the whole the results to health have been very satisfactory. In one garden, the August sick-rate has dropped from 19·6 per cent. to 2·5 per cent., and this may be claimed as fairly typical of the results obtained.

W. F.

WHITE (R. Senior) & ADHIKARI (A. K.). **Anti-Gametocyte Treatment combined with Anti-Larval Malaria Control.**—*Records of the Malaria Survey of India.* 1934. June. Vol. 4. No. 2. pp. 77–94. [16 refs.]

A single course of quinine and plasmoquine given at the beginning of the malaria season to all the children living in an area under anopheline control caused no permanent improvement.

The Railway Settlement of Dangoaposi has been under malaria control ever since the epidemic which marked the opening of the line in 1925. The rice-fields have been treated with Paris green since 1930, because it was found that *A. culicifacies* bred in puddles in those portions which lay fallow. The object of the experiment here described was to determine whether the good results already obtained could be improved by an antigametocyte treatment. Each child was given a ten-day course of euquinine with 5 days of plasmoquine in the middle of the course. The average daily doses for children between 7 and 10 were 7·4 grains of euquinine and 0·012 gram of plasmoquine. Toxic symptoms appeared in two cases. The immediate effect of the treatment was to cure 53 per cent. of the benign tertian and 85 per cent. of the subtertian cases, and also to remove 83 per cent. of the gametocytes. But, by the end of the season, the numbers of infections and the numbers of gametocyte carriers were as high as at the beginning of the experiment. "It is therefore obvious that, even with a high degree of efficiency in anopheline control, no additional good is to be looked for by a single attack on the gametocyte carriers at the commencement of the season." *W. F.*

ROBIN (L. A.). Résultats pratiques de la prophylaxie antipalustre en général et de la lutte antilarvaire en particulier sur quelques exploitations agricoles en Indochine méridionale. [**Malaria Prevention on Estates in Southern Indo-China.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1934. Apr. Vol. 12. No. 4. pp. 378–401. With 8 graphs & 4 plates.

——. Ce qu'il faut entendre par "assainissement spontané" des plantations en Indochine méridionale De la prémunition chez l'adulte. [**The Meaning of Auto-Sanitation of Estates. Premunition.**] *Ibid.* pp. 402–421. With 3 graphs.

Antilarval methods are necessary.

The author gives a number of graphs and diagrams showing how malaria has been successfully combated on rubber estates in Indo-China. Quinine prophylaxis prevents illness from malaria and greatly reduces the daily sick-rate. For example, on an estate where 0·5 gram was given daily, the sick-rate was reduced from 30 to 17 per cent. in 6 months and the death rate from 5 to 2·2 per cent. Prophylactic quinine is not satisfactory however, because it does not reduce the number of infections ; on this same estate during the same period the splenic index increased from 75 to 92 and the parasitic index remained unreduced at about 60 per cent. (see LACAUX below). Under such conditions any relaxation of supervision means an outbreak of illness. Malarial infection on such an estate can be effectively reduced only by combining antilarval measures with the quinine prophylaxis. By this means the splenic index was reduced 50 per cent. in six months and the parasitic index even more.

On some estates where reliance was placed solely upon prophylactic quinine, malaria increased to such an extent that the land was abandoned ; but in other cases, the terrible losses from malaria gradually became less and, after a few years, although nothing had been done, the estates appeared to have effected their own sanitation. Several examples are given, where the sick rate was only 3 to 10 per cent., but on examination it was found that the splenic index was about 84 per cent. and the parasitic index nearly as high. The improvement was not due to eradication of infection, but to premunition, that is an acquired tolerance on the part of the adult coolies which was associated with latent infection. The non-immune children suffered severely ; the birth-rate was low, the infantile deaths and the abortion rates were high. This condition of equilibrium is reached in about 5 years, provided fresh labour is not imported. The arrival of new, non-immune coolies on such an estate means a fresh outbreak of malaria. From every point of view, humanitarian, political, and financial, antilarval measures combined with the judicious administration of quinine should be employed on rubber estates situated in the malarious regions of Southern Indo-China. *W. F.*

ROBIN (M.). La prophylaxie antipaludique dans les plantations de l'Indochine Méridionale. La lutte antilarvaire. Son efficacité. [**The Prevention of Malaria in the Rubber Estates of Indo-China.**]—*Bull. Soc. Path. Exot.* 1934. July 11. Vol. 27. No. 7. pp. 691–699.

Antilarval measures succeeded where quinine and improved general sanitation had failed.

The author gives a number of instances of the calamities due to malaria which occurred when rubber estates were being opened in virgin jungle and labour was being imported. In one plantation 200 coolies out of a total labour force of 650 died during the first year. The removal of the whole village from the marsh where it was situated to high ground some distance away made but little difference. Prophylactic quinine did not lower the rate of infection ; the few children born on the estate died in infancy. Antilarval work was then undertaken by means of open drains and oiling. When the drains were finished in July 1929, the daily average sick rate was 20 per cent. of the labour force ; by September it had fallen to 15 per cent., and throughout 1930 it was only 2·5 per cent. On another estate where antilarval measures were equally successful and where the daily sick-rate was reduced from 15 to 4 per cent. within a year, the transfer of the manager, and consequent withdrawal of European supervision, resulted in a return of malaria, and a few months later the sick rate was as high as ever. *W. F.*

FARINAUD (E.). Un exemple de prophylaxie antianophélienne : Tri-cu. [**Anti-Anopheline Prophylaxis at Tri-cu.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1934. Mar. Vol. 12. No. 3. pp. 345–360. With 1 chart & 3 figs.

——. Essai de prophylaxie rationnelle du paludisme en milieu infantile à Tri-Cu (Tonkin).—*Bull. Soc. Path. Exot.* 1934. June 13. Vol. 27. No. 6. pp. 568–575.

Amelioration produced by brush-oiling.

An outbreak of malaria occurred in a kind of reformatory for children at Tri-cu. As a measure of urgency a daily dose of quinine was given. This stopped the fatalities and most of the sickness ; the children were able to resume their agricultural employment, but the parasite and spleen rates were still high. Drainage and oiling by Quaife's brush method (see VICKERS, above) brought about a great improvement. *W. F.*

LACAUX (J.). Que pensez-vous de la quinine ? [**What of Quinine ?**]—*Rev. Méd. et Hyg. Trop.* 1934. May–June. Vol. 26. No. 3. pp. 154–159.

The successful employment of prophylactic quinine on rubber estates.

The author's observations as to the value of prophylactic quinine on a number of estates in Indochina, employing altogether 35,000 coolies, are as follows :—(1) Where no prophylactic quinine is given, the proportion of sick may reach 80 per cent. (2) Where quinine is given intermittently the daily sick rate is about 30 per cent. (3) Where it is given regularly the figure is 12 per cent. (4) Where regular quinine is combined with destruction of anopheline breeding places malaria disappears, as, for instance, on the Michelin rubber plantations at Dao-Tieng and Phow-Rieng in Cochin-China. *W. F.*

HENDERSON (L. H.). **Prophylaxis of Malaria in the Sudan, with Special Reference to the Use of Plasmoquine.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Aug. 4. Vol. 28. No. 2. pp. 157–164. With 6 graphs.

The best results were obtained with a small bi-weekly dose of plasmoquine as an adjuvant to anti-larval operations.

The Gezira is the extensive cotton growing area of the Sudan ; it is a stretch of flat land 700,000 acres in extent along the west bank of the Blue Nile. The malaria season is from September to January, and it is just at this time that the cotton fields are irrigated. The maximum rainfall is in July. The carrier is *A. gambiae*. Little breeding occurs until September ; it is then almost synchronous with the rapid increase of malaria which occurs during that month. The chief method of prophylaxis is extremely active anti-larval measures, but this work is complicated by the necessity for artificial irrigation of the growing crops during the most malarious period of the year. The author therefore decided to see what could be accomplished by means of plasmoquine. An isolated group was treated with quinoplasmine for a fortnight, at the end of which time parasites were found in only one. For the next 3 months, each adult was given 0·02 grams of plasmoquine simplex daily with half doses for children. During the first part of the time there was a considerable reduction in the incidence of malaria, but towards the end the parasite rate rose to almost the same height as in the control group, though the general health of the treated group was greatly improved and very few showed symptoms of clinical malaria. A second series of experiments was carried out in boys' schools ; here 0·02 gram of plasmoquine simplex was given twice a week, for a period of ten months, with the object of destroying the gametocytes. During the time that the treatment lasted, gametocytes practically disappeared from the blood, there was a considerable reduction in the amount of malaria and the general health of the boys was greatly improved. After the cessation of the treatment, all these good results gradually disappeared, and when the schools were revisited a year later, conditions were much the same as they had been before it was carried out. No toxic symptoms were caused by the plasmoquine. The author concludes that " small daily doses of the drug for causal prophylaxis are not recommended as they tend merely to conceal infection. The results of experiments in gametocyte prophylaxis tend to show that a bi-weekly dose of 0·02 gramme plasmoquine simplex to children might be of value in anti-malarial work." *W. F.*

LEGENDRE (F.). Expériences de projection de poudres larvicides par avions à Madagascar. [**Larvicidal Powder spread by Aeroplanes in Madagascar.**]—*Bull. Soc. Path. Exot.* 1934. June 13. Vol. 27. No. 6. pp. 603–608.

Paris green was spread by low-flying military aeroplanes over marshes and rice-fields in the environs of Antananarivo. Though this by no means destroyed all the larvae, it secured an appreciable diminution in the number of mosquitoes. *W. F.*

RUSSELL (Paul F.) & EATON (L. S.). **An Automatic Distributing Machine for Paris Green Mixtures.**—*Philippine Jl. Sci.* 1934. Apr. Vol. 53. No. 4. pp. 497–503. With 2 figs. & 2 plates.

This paper describes an automatic distributing machine for Paris green which is driven by the stream in which the larvicide is to be distributed. *W. F.*

PECKOLT (Waldemar) & PRADO (Alcides). Ensaio da acção larvicida do *Enterolobium timbouva*, Mart., (Leguminosae), na prophylaxia culicidica. [*Enterolobium timbouva* **Mart., as a Culicide.**]—*Ann. Paulist. Med. e Cirurg.* 1934. Sept. Vol. 28. No. 3. pp. 261–263.

Enterolobium timbouva is a tree known to be poisonous for cold-blooded animals, and is used by the natives for poisoning fish. It thrives in Rio de Janeiro and the southern States of Brazil. Its wood and bark contain a saponin which with water or alcohol, in either of which it is readily soluble, forms a sapotoxin.

A table gives the results of some experiments on its use as a larvicide and shows that it is rather less effective than Paris green. *H. H. S.*

JATSENKO (F.). [**The Use of Chlorpicrine as a Mosquito Larvicide.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1934. Vol. 3. No. 1. pp. 91–93. [In Russian.]

In an attempt to find cheaper substitutes for Paris green the author conducted a series of field experiments with various substances. The present paper records the results obtained with chlorpicrine.

Chlorpicrine can be employed against mosquito larvae (1) as a fumigant, and (2) as an intestinal poison. In the first case, chlorpicrine in the proportion of 1 litre per 1 hectare of water surface is mixed with 1 kilogram of fine road dust and 2 litres of paraffin oil, the mixture being kept in a well-closed receptacle for 4–6 hours. Just before being used it is mixed again with dry road dust, the whole mass is placed in a pulverizer and sprayed over the surface of the water. This treatment results in the destruction of 100 per cent. mosquito larvae, pupae and eggs, as well as of some other aquatic animals, in 24 hours. Fish are affected only when the depth of the water does not exceed 12–15 cm. Owing to the harmful action of chlorpicrine upon the eyes, human beings and cattle should be kept away from the area under treatment for about 2 hours. When used as an intestinal poison, 100–150 grams chlorpicrine are mixed with 1 kilogram of flour, 1 kilogram of fine road dust and 100–150 grams of paraffin oil, the total amount being the dose per 1 hectare. The mixture is kept for 24 hours in a closed vessel after which it is again mixed with 4 or 20 times its weight of dust (according to whether it is spread by means of a pulverizer or by hand respectively). By this method all mosquito larvae (but not their eggs or pupae) can be destroyed in 10–12 hours. The use of chlorpicrine as an intestinal poison has certain advantages over its use as a fumigant: (1) a smaller amount of it is required, (2) its action upon the larvae is more rapid, (3) it can be applied by hand. However, in other respects the first method is superior. *C. A. Hoare.*

KUTCHER (S.). [**Anthracene—a New Mosquito Larvicide.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1934. Vol. 3. No. 2. pp. 141–148. [In Russian.]

Experiments were conducted with the object of testing the effect of anthracene upon mosquito larvae, using the refuse of coke-benzole works containing about 12–15 per cent. pure anthracene. The best results were obtained, both under laboratory conditions and in the field, with a mixture of this substance and dust containing 10 per cent.

anthracene. The mixture is spread over the surface of the water by means of a pulverizer. Repeated tests showed that practically 100 per cent. mosquito-larvae (anopheline and culicine) are destroyed by this method. Since about 900 tons of the anthracene-containing substance are thrown out monthly in the Ukraine, this industrial refuse represents an economical substitute for Paris green. Its effect upon fish and water-vegetation has not been determined. *C. A. Hoare.*

BROWN (J. Youngson). **Safe Mosquito Nets for Use in Nigeria.**—*West African Med. Jl.* 1934. Apr. Vol. 7. No. 4. pp. 147–148.

Netting of 25/26 gauge was found sufficient to exclude mosquitoes.

These experiments were undertaken to determine if it would be possible to exclude mosquitoes by a net of larger mesh than the 42/44 mesh in common use, and to increase ventilation and comfort without sacrifice of efficiency. A rectangular box was divided into two compartments by a removable frame upon which pieces of mosquito netting of differing mesh were stretched and tested, mosquitoes were put in the box on one side of the netting and a guineapig was put in on the other side. A netting of 25/26 gauge was sufficiently fine to prevent the passage of mosquitoes and this was confirmed by its use in the field. *W. F.*

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REVIEWS AND NOTICES.

ASHFORD (Bailey K.). **A Soldier in Science. The Autobiography of Bailey K. Ashford.**—425 pp. With 4 plates. 1934. London: George Routledge & Sons Ltd. Broadway House, 68–74 Carter Lane, E.C.4. [12s. 6d.]

Bailey Kelly Ashford died on 1st November, 1934, the date of publication of this autobiography. Of Devon stock on both sides, he was son of the Professor of Surgery and later Dean of the Medical School at Georgetown who was called in too late when President Garfield was shot, and who had fought for the South in the Civil War. Influenced by his striking personality, Ashford decided on the U.S. Army Medical Service as a career. The Spanish American war took him to Porto Rico, where he married Maria Anuncion Lopez, daughter of the Marques de Villar, a republican in spite of his title. Ashford was stationed at Ponce when it and its surrounding district was devastated by the hurricane on San Ciriaco's day, 8th August, 1899, and which left homeless 800,000 persons for the army to keep alive. It was the finding that these starving anaemics did not get better with good food that led to his discovery of eosinophilia in their blood and hookworm eggs in their stools, and to the now famous telegram to his superior announcing that he had proved that many of the pernicious progressive anaemias of Porto Rico were due to hookworms. It is true that in French and German handbooks on zoology and on historical and geographical pathology the presence of hookworms had been recorded before 1883, but the local knowledge of this is sufficiently shown by the volume of local ridicule, medical and lay, which met Ashford's announcement that the anaemia from which the jíbaro [peasant] so terribly suffered was due to a worm and not to malnutrition. Ashford's reduction by thymol treatment of the island's mortality from anaemia by 85 per cent., with its increase of the jíbaro's earning capacity by 60 per cent., proved convincing to opponents. The book tells how Ashford was enabled to reach the position to do this by obtaining the headship of a Commission to investigate this point. As is so well known there followed a notable campaign admirably executed.

As to the details of its repercussions in the United States, STILES writes to the reviewer that Ashford's memory is to some extent at fault. When Mr. Rockefeller's office agreed to put up a million dollars for hookworm work in the South, it was insisted that STILES should resign Government Service to give his whole time to administering the fund. Having agreed to the resignation, STILES proposed that the work should be divided into administrative and scientific sides. He was appointed scientific secretary and upon consultation with Walter Page, later Ambassador in London, suggested J. Y. Joyner as administrative secretary; and when, after the announcement of Mr. Rockefeller's gift had been made, he refused, Page shortly after selected Wickliffe ROSE in that capacity. That is to say the hookworm campaign was determined upon before ROSE joined its staff. So, too, does Ashford's memory appear to have been at fault as to the handing over for description to HASSALL, Stiles's assistant, of his original specimens of hookworms from Porto Rico, Ashford having recognized that they could not be *Ancylostoma duodenale* since they had "no front teeth." The specimens are in the Army Medical Museum. Although in the interests of medical history these statements have to be made, they do not affect in any way the magnificent work which Ashford did.

In entertaining fashion Ashford tells of his various delegations to Europe, Brazil, Cuba, Dominica and Egypt (in the last he received from King Fuad the Grand Cordon of the Order of the Nile), and his responsibilities for American troops in France during the Great War. Nearly a third of the book is taken up with this last. He was with the first division which left America, and in France had command of the school at Langres for the battle training of all medical officers of the A.E.F. He obtained the D.S.M. and Honorary C.M.G., and on recall to Washington became Editor in Chief of the United States Medical History of the War. His other main administrative work was the founding of an Institute of Tropical Medicine and Hygiene in Porto Rico, and its growth into a School under the auspices of Columbia University, New York.

His later scientific work was concerned with sprue. His final conclusions, drawn from an examination of 4,000 cases, was that the great underlying condition was nutritional imbalance, and that when *Monilia* gains a footing in such cases it converts disordered nutrition into a definite morbid entity.

Part of the last paragraph of the book consists of these notable words. " The doctor's mission from this time forward, as I see it, is not so much a question of relief of pain, or of prevention of death, as it is a question of salvaging this man, this woman, this child for one hundred per cent. efficiency in the future. . . . This story tells how I have tried to do it." *Clayton Lane.*

SCOTT (H. Harold) [M.D., F.R.C.P. (Lond.), D.P.H., D.T.M. & H., F.R.S.E.]. **Some Notable Epidemics.** With Preface by W. W. JAMESON, M.A., M.D., F.R.C.P.—pp. xix+272. With 1 fig. 1934. London: Edward Arnold & Co. [12s. 6d.]. [Review appears also in *Bulletin of Hygiene.*]

Few who are familiar with the names of the local epidemics of historical importance have easy access to the original reports. Yet it is impossible to obtain any idea from brief text-book references as to the kind of problems with which the investigators were faced or their method of approach to them. The original reports, too, dwell upon details which had to be considered in the light of the knowledge and prejudices of the time but which now seem largely irrelevant. They needed re-writing, sub-editing and commentary, and that is what the author of this book has done. Selection for publication from the substantial body of epidemics, about which official or other reports are in existence, must be arbitrary. Nineteen groups of local outbreaks, most of them single epidemics, have been chosen, all of them British, most occurring within the past half century and nearly all of special historical as well as epidemiological interest. Six were outbreaks of water-borne disease, including the famous Broad Street Pump epidemic of cholera and the classical Maidstone typhoid ; ten were attributed to milk convection ranging from the sensational enteric outbreak of St. Marylebone in 1873 to the comparatively recent epidemic of sore-throat in 1929 at Brighton and Hove ; one oyster-borne and the rest food-poisoning, dysentery or other alimentary infections carried by a variety of foodstuffs. The arrangement of the epidemics, partly chronological, partly in such a way as to illustrate the evolution of aetiological ideas and preventive practice, carries the reader from outbreak to outbreak with increasing interest. Each epidemic is discussed

in the light of modern knowledge and interspersed with illuminating, and sometimes humorous, comments which break the monotony of fact piled on fact in building up a hypothesis. A recent correspondent of the reviewer said about this book "The best detective yarns I have read for a long time." That is an interesting appreciation and indicates the writer's success in making the dry bones live, but the stories here retold are more than that, they show how repeated warnings to local authorities have been neglected until at last disaster fell upon them, how their niggardliness has cost them in the end more than they have saved, how careful epidemiological investigation can often arrive at true explanations without the aid of laboratory technique, and how the prevention of epidemics of alimentary disease depends on the careful application of sanitary principles all the time, for the infection is very often past before emergency measures can be put in force. Recent happenings in Malton and Denby Dale (water-borne typhoid), in Ogmore (water-borne dysentery), in Hertfordshire (milk-borne paratyphoid), in Chicago (amoebic dysentery) and in other places too numerous to mention show that complete security is still far from being attained. In tropical and other countries with relatively low hygienic standards, the risk is far greater. If war ever breaks out again over a wide area, recurrence of conditions favourable to outbreaks of intestinal infections is likely. Every public health official should be prepared to cope with epidemiological earthquakes of the kind depicted and brought together for his information in this book, and others will read it with profit and enjoyment. *R. M. F. Picken.*

ROGERS (Leonard) [K.C.S.I., C.I.E., M.D., F.R.C.P., F.R.S.] & MEGAW (John W. D.) [K.C.I.E., B.A., M.B., Hon. D.Sc.] **Tropical Medicine.** Second Edition.—pp. xii+547. With 82 text figs. & 93 coloured figs. on 2 plates. 1935. London: J. & A. Churchill Ltd., 40 Gloucester Place, Portman Square. [15s.]

In the preface to this, the second edition of "Tropical Medicine," the authors again point out that "their aim from the onset has been to produce a handy inexpensive manual which would not compete with the larger works on tropical diseases." Their policy has been justified by the cordial reception awarded the first edition which appeared five years ago. The chief additions that have been made belong to the realms of the typhus fevers, yellow fever, malaria, leprosy and the nutritional diseases. The great feature of the book is that it is essentially *readable*, it deals with the subject matter from the point of view of the man *practising* medicine in the tropics, and contains the harvest of ripe experience gathered during many years.

It fell to the lot of the present writer to review the first edition and the invitation to offer criticisms and suggestions was taken advantage of. Some of the suggestions made have been adopted, others it is explained could not be. Others are now offered in the interest of all. The paragraph upon the immunizing mechanism in malaria is not clear. The authors note that the term bilious remittent malaria is falling out of use. Is it not time this division into clinical types, which savours of the middle ages, was replaced by a pathogenic explanation of the symptomatology? As it is, pathology is divorced from symptomatology and there is no obvious correlation. It is noted also in regard to malaria there is no mention of myocarditis. In the chapter dealing with tick relapsing fever there is no mention of ticks other than

O. moubata that transmit the infection and no mention of those cases which are resistant to treatment with arsenicals.

There is no mention of sprue as occurring in northern Europe. In reference to the chigger the statement is made "after all the eggs have escaped the insect is expelled and the small remaining ulcer heals. Any number, from one to hundreds, may be present; as a rule only a few are found at one time." It would be truer to say that the remains of the body of the chigger unless removed are eventually expelled by ulceration. In many cases the feet and hands may be literally honeycombed.

In regard to ankylostomiasis there is no mention in the text of the 50–100 per cent. incidence in Eastern Africa. Beriberi is not mentioned as occurring in Africa.

Although lathyrism is coupled with beriberi and pellagra as diseases associated with the use of a special article of diet and considerable space is given to the consideration of vitamins and their relation to deficiency diseases, no mention is made of MELLANBY's very interesting observations in regard to this disease.

Under yaws the causative organism is sometimes referred to as a spironema elsewhere as a treponema. The disease in one place is said to be rarely inherited, in another place it is said to be not congenital.

These are given merely as examples of minor additions which might perhaps be added with advantage to the text. *H. S. Stannus.*

WU LIEN-TEH [Edited by]. **Manchurian Plague Prevention Service Memorial Volume 1912–1932.**—469 pp. With 2 text figs., 1 plan, 2 charts, 29 figs. on 13 plates & 1 coloured plate. 1934. Shanghai: National Quarantine Service, 2 Peking Road.

This volume, which is dedicated to the delegates attending the 9th Congress of the Far Eastern Association of Tropical Medicine at Nanking in October, 1934, is as its title states a memorial volume. The Manchurian Plague Prevention Service, which the author has led with so much competence, has "passed into other hands." The two decades of useful work which the book commemorates have come to an end. We have here a collection of the best original articles that have appeared in the seven volumes of Reports of the Manchurian Plague Prevention Service. Of these, 16 concern plague, 4 cholera, 10 miscellaneous topics, and the appendix is a short autobiography of Dr. Wu. The plague articles making up as they do more than half the book will have a permanent value, especially those concerning the pneumonic form, for students of that disease. Attention is called to the list of wild rodents known or suspected to suffer from plague, revised to December 1932, and occupying, with the list of fleas, 14 pages.

Since Dr. Wu is only 55 years of age it is to be hoped that he may find a fresh field for his fruitful energies. *A. G. B.*

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